101

# Syllabus

TECHNOLOGY FOR HIGHER EDUCATION

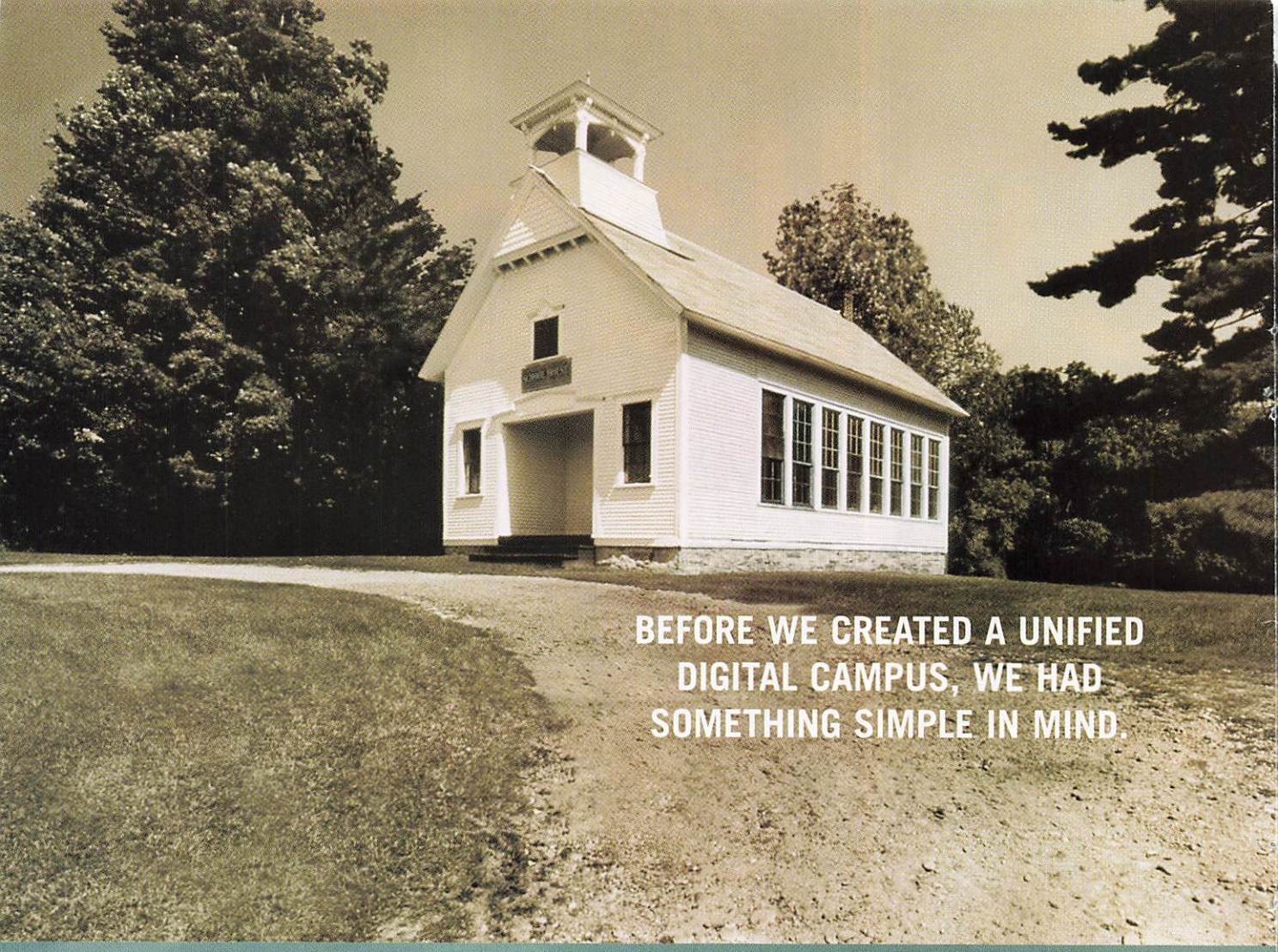
MARCH 2002 • VOLUME 15, NO. 8

A 101communications Publication

## A BRIDGE TO THE FUTURE

### Building a Digital Library

SEARCH ENGINES • STANDARDS • DIGITAL COLLECTIONS




We wanted to make your campus as intimate and interconnected as a one-room schoolhouse. That's why we built the Campus Pipeline™ Web Platform.

Our platform brings faculty, administrators and students together in an online environment that provides easy access to a unified network of information, academics, services and communities.

With its integration infrastructure, customizable portals and enterprise applications, our solution is the most widely used Web Platform for higher education. And every day, we're helping more campuses put these technologies together under one online roof.

To unify your digital campus, call us at 1-888-682-7473, or go to www.campuspipeline.com/unify

**INTEGRATION INFRASTRUCTURE / CUSTOMIZABLE PORTALS / ENTERPRISE APPLICATIONS**

campus pipeline™

©2002 Campus Pipeline, Inc. Campus Pipeline and the Campus Pipeline logo are trademarks of Campus Pipeline, Inc.

Unifying the digital campus

# Syllabus 2002

TECHNOLOGY FOR HIGHER EDUCATION

# NINTH ANNUAL SUMMER CONFERENCE

In 1994, ***Syllabus*** magazine convened a small group of educators to explore the ways in which the new accessibility of personal computing could improve teaching in the classroom. Every summer since then, amid the growth of hi tech, the Syllabus Conference has gathered educators, administrators, and IT managers in a lively and collegial environment to discuss the latest trends and share best practices.

This year, Syllabus returns to the warm, familiar environment of Santa Clara for three days of keynotes and breakout sessions along with two days of pre-conference workshops. With many more highly interactive sessions than in any previous year, Syllabus2002 promises to be ***the*** place for professional communication and exchange of ideas.

*Come join the Syllabus community in this, our ninth year of bringing together the pioneers and leaders in education technology.*

***RESERVE YOUR PLACE!***

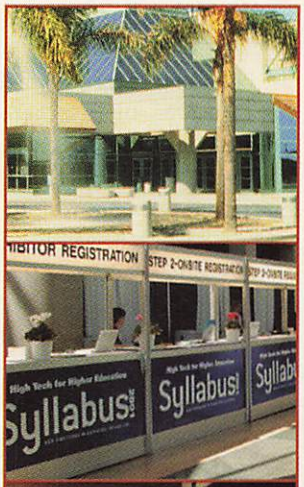
*Conference pricing and registration information is available online at:*

***www.syllabus.com/summer2002/***

## Conference Tracks and Themes

- **New Technologies Update**
- **IT Planning for the Academic Enterprise**
- **Standards and Open Source**
- **Web-Based Environments**
- **Evaluation and Assessment**
- **Faculty Innovation**

***Register by May 31 or as a group for significant savings.***
***For more information, call (800) 280-6218.***



**July 27-31**

**Santa Clara Convention Center in the heart of Silicon Valley, California**

- **Pre-conference Saturday-Sunday July 27-28**
- **Main conference Monday-Wednesday July 29-31**

# EDITOR'S NOTE

Mary Grush, Editor

In this issue we take a look at digital libraries and digital resource collections. Where do you get your information? Do you use the library the same way you did five years ago? Or even two years ago? But wait, maybe the question is, "Do you still use the library at all?"

The digitization of library materials offers new possibilities for access, preservation, and the sharing of resources. But it also presents a significant question for librarians about the types of services their libraries should offer. "Trends" columnist Phil Long (page 8) ponders this question in terms of courseware development and the inclusion—or lack thereof—of library materials in online courses. Are libraries prepared to offer services tailored to online course developers?

A study conducted by UCLA's Higher Education Research Institute estimated that four out of five freshmen use the Internet for research and homework. That in itself is not necessarily a bad thing; the point to consider is whether the libraries can know and support those students. At Rutgers University, the answer is probably "yes," because for close to five years, a long-term planning process has represented students, along with other key campus groups and organizations, in the formation of digital library initiatives. In "A Bridge to the Future: Observations on Building a Digital Library" (page 12), Rutgers University Librarian Marianne Gaunt describes the involvement of the university community along with the issues and concerns of the library.

Almost synonymous with library use is scholarship. But as philosophy professor Peter Suber explains in his article about Noesis (page 18), scholars can now do their own collection development by identifying existing collections with a powerful search engine, and then editing and combining found collections using a simple drag-and-drop function. How will higher education's libraries interface with discipline-specific digital collections?

While the answers to questions about new library services are not simple, the opportunities are tremendous for digital libraries. As libraries are transformed and missions redefined in the context of a more digital environment, your answer to my question, "Do you still use the library at all?" may become, "Of course, I'm *always* connected!"

I hope you are planning to attend Syllabus2002, our ninth annual summer conference. We're returning to the Santa Clara Convention Center July 27-31 with a very full program in the main conference (Monday-Wednesday), and two days of intensive workshops and seminars during the pre-conference weekend. We're pleased that the TLT Group will join Syllabus again for two full days in the pre-conference. Fees and registration information is now on the Web. Substantial discounts are available for early and group registrations—the early bird discount can be taken through May 31. For conference information, visit www.syllabus.com.

Enjoy this issue of *Syllabus!*

Mary Grush

**Letters to the editor** should be addressed to the editor and sent to 101 First Street, #605, Los Altos, CA 94022, or via electronic mail. We reserve the right to edit all submissions. **News and product information** will be considered for publication. Please send all materials to Paul McCloskey. If you are interested in writing for *Syllabus*, please send a brief description of your article idea along with writing samples to the editor at the above address.


Syllabus
NEW DIMENSIONS IN EDUCATION TECHNOLOGY

Editor Mary Grush
*mgrush@syllabus.com*
Contributing Editor Paul McCloskey
*paul.mccloskey@att.net*
Columnists Phillip D. Long
Steven W. Gilbert
Sally M. Johnstone
David G. Brown
Art Director Jeffrey Langkau
Associate Art Director Susan Morrison
Graphic Designer Allison Cusato
Production Editor Terri J. Huck
Contributors Brian Boyd
Kathleen Cahill
Jean Foster
Marianne I. Gaunt
Tom Moore
Nishikant Sonwalkar
Peter Suber
Writer Catherine Murphy
Copy Editor Linda Jay Geldens
Founder John P. Noon

Publisher Mark Sande
Production Director Joleen Mathews
Business Manager, Operations Carlos Gonzalez
Production Coordinator Taura Scott
Audience Marketing Manager Erik Gauger

Editorial Office - Syllabus Press
101 First Street, #605, Los Altos, CA 94022
Phone: (650) 941-1765
Fax: (650) 941-1785 *(info@syllabus.com)*

SyllabusWeb:
www.syllabus.com

Syllabus E-Newsletter:
http://lists.101com.com/syllabus

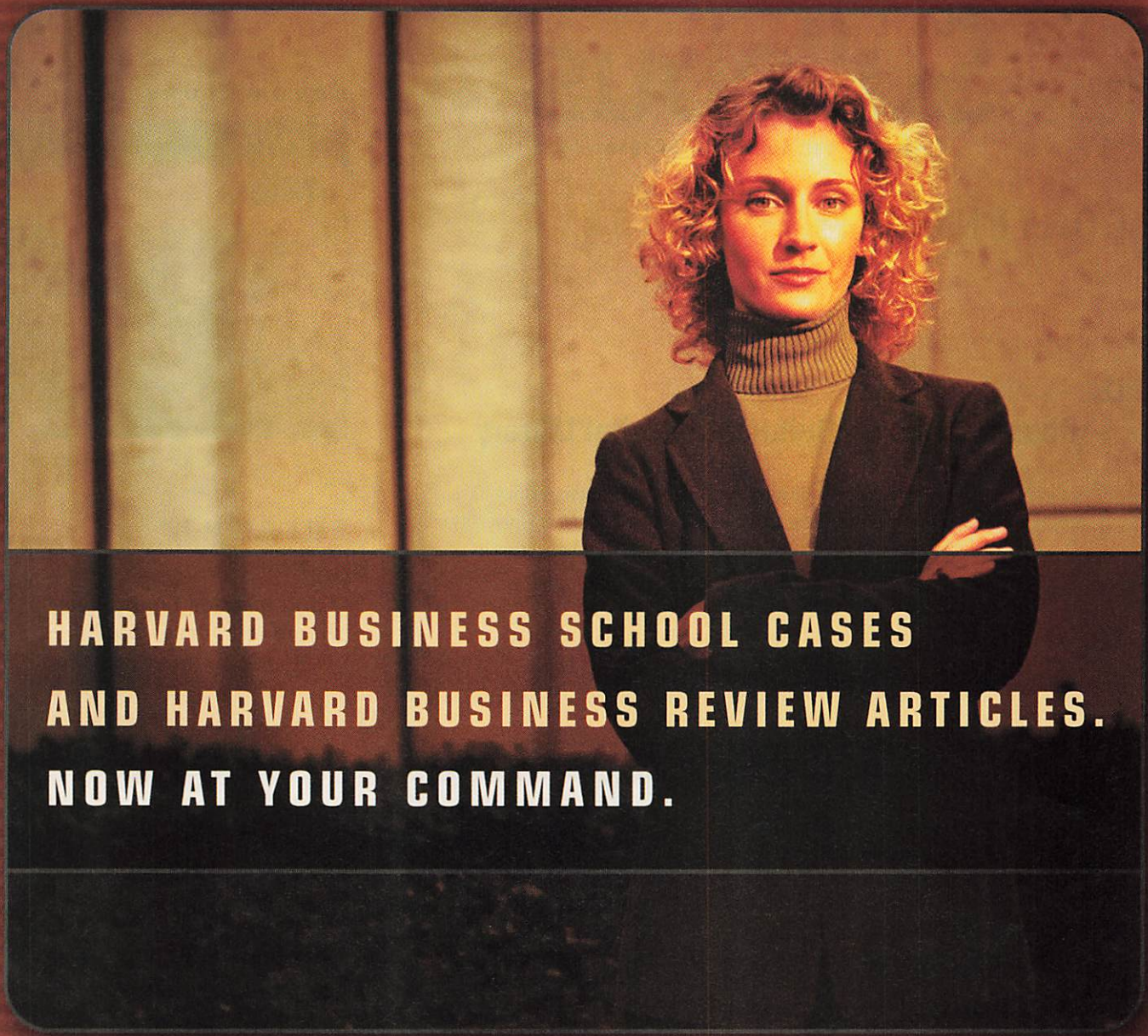
WPA Winner Maggie Awards



Syllabus Magazine Advisory Board

Corporation for Research and Educational Networking Judith V. Boettcher
Princeton University Jacqueline Brown
Carnegie Mellon University Robert Cavalier
University of Wisconsin-Madison Kathy Christoph
University of Texas-Austin George Culp
De Anza College William Pritchard

ABP BPA International WPA Western Publications Association



# HARVARD BUSINESS SCHOOL CASES AND HARVARD BUSINESS REVIEW ARTICLES. NOW AT YOUR COMMAND.

**XanEdu is proud to announce a partnership with Harvard Business School Publishing.**

Now we'll be adding Harvard Business School Case Studies, the world's premier collection of business case studies, as well as landmark articles from *Harvard Business Review* to our already incredibly robust content. You can easily order the materials through our online CoursePacks. You may also receive them traditionally through our printed packs. Plus, they can be combined with any of our rich resources to create incredibly powerful, relevant, and up-to-date coursepacks. XanEdu makes it simple. So you can spend time doing what you do best: teaching.

HARVARD BUSINESS SCHOOL PUBLISHING

XanEdu™

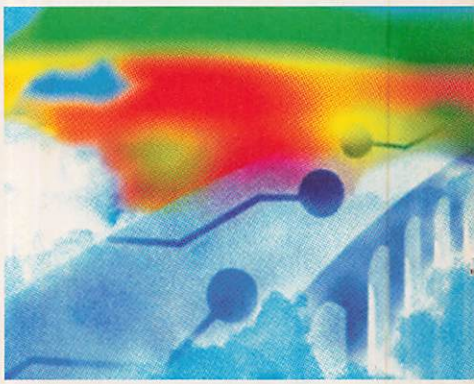
**For more info visit: www.xanedu.com or call 800.218.5971**

# Syllabus

Vol. 15, No. 8 Syllabus Press


## CONTENTS MARCH 2002

COVER STORY PAGE 12



*Cover art:* Jeff Langkau

### FEATURES


12 **A Bridge to the Future: Observations on Building a Digital Library**

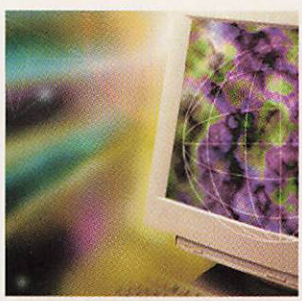
*Marianne I. Gaunt*

Libraries today are not merely adjusting to changes in technology; they have entirely new choices to make in the services they provide. Rutgers University faced these challenges with a plan involving the key stakeholders across its campuses.

18 **Noesis: Is it a library with built-in searching or a search engine with a built-in library?**

*Peter Suber*

Scholarly communications will no longer be a cumbersome, time-consuming, and expensive process. With new search engines and software like Noesis, works can be reviewed more efficiently and digital collections compiled more easily.



26

26 **Demystifying Learning Technology Standards Part I: Development and Evolution**

*Nishikant Sonwalkar*

The first of a two-part article introduces readers to the evolution, development, and leading organizations in learning technology standards.

30 **Tailor-Made Degrees: Customized Corporate Education**

*Tom Moore*

Working professionals often pursue advanced degrees. Their academic work may or may not complement their employment. This article examines how corporations and higher education institutions can work together to provide employees with degree programs that incorporate company-specific content.

30

### COLUMNS


8 **Trends**

Can Libraries Find a New Home in Courseware?

*Phillip D. Long*

23 **Distance Learning**

Opting Out Online

*Sally M. Johnstone*

24 **Faculty Practice**

Preview and Review

*David G. Brown*

25 **Technology Implementation**

Let Students Be Your Tech Support

*Steven W. Gilbert*


### DEPARTMENTS


4 **Editor's Note**

34 **Case Studies**

38 **Buyer's Guide**

Educator's Review

*Brian Boyd*

42 **Advertiser Index**


**SYLLABUS EVENTS** **Syllabus2002 Annual Summer Conference** (p. 3)

# Academic Job Board

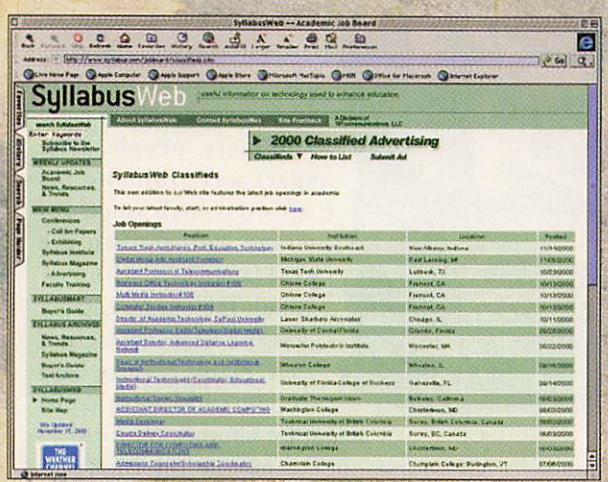
now on

# SyllabusWeb

## www.syllabus.com

SyllabusWeb connects a community of higher education professionals dedicated to using technology to further teaching, learning, and administration.

**To view the latest offerings in the education job market, visit the Academic Job Board on SyllabusWeb.**



To post a job, contact

**The Job Board**

1-800-SYLLABUS ext. 4

FAX 818-734-1529

jobboard@syllabus.com

101communications

**Phillip D. Long**

*Phillip D. Long is senior strategist for the Academic Computing Enterprise at MIT. He is also a senior associate for the TLT Group of the American Association for Higher Education. longpd@mit.edu*

# TRENDS

AN INFORMATION RESOURCE OF INTEREST TO EDUCATORS

## Briefs

- UCLA and Hewlett-Packard Co. received a patent for **molecular electronics technology** that could augment silicon-based integrated circuits and eventually replace them.
- The **United Negro College Fund** has raised more than $86 million to provide computers and technology at 39 UNCF member institutions and historically black colleges.
- Stanford is developing a portfolio of online "courselets"—**self-contained sets of Web-based learning materials**—to support online graduate courses in engineering, science, and engineering management.
- The University of Oklahoma, Iowa State, and Texas Tech are Web casting **subscription-based sports programming** to students as a fund-raising mechanism.

For these and other news stories, or to subscribe to the weekly Syllabus e-News, Resources, and Trends, visit www.syllabus.com.

## Can Libraries Find a New Home in Courseware?

A funny thing seems to be happening on the way to creating courseware sites for all students. Increasingly, faculty are using online learning tools to assemble in one convenient electronic place the syllabus, assignments, problem sets, and resources their students need to do the work for their courses. Resources often subsume links to relevant readings, articles, or other electronic documents and Web sites that enrich the course—a one-stop e-home for the class. Sounds great, right? But something is missing.

The largest, best organized, and most accessible information warehouse on any campus has always been the university or college library. Since the days of the Alexandria library in ancient Egypt, it has been the responsibility of librarians to select, arrange, preserve, and interpret mankind's information store.

For those who understand its riches, the library is a joyous place, with ideas, paradoxes, and surprises around every stack. Yet in the midst of the digital revolution, the very epicenter of our collected wisdom is not only being transformed into bits, it is being dispersed as a concept.

Libraries were among the first campus organizations to embrace the introduction of technology. As early champions, they began creating electronic records of their holdings to facilitate finding and retrieving the vast amount of information they collected and maintained. Books were bar-coded and manual processes automated to increase efficiency. The cost-efficiency was obvious, but the result was unexpected.

Patrons could easily and quickly find materials first from proprietary terminals, later from any network-connected terminal emulator. What they could not do is get the content delivered to them electronically.

Similarly, libraries moved to get abstracting and index databases online, giving library users the same access to journal citations as they had to books. Initially, those resources were costly and limited to specially trained reference librarians. But as costs decreased, libraries began to make full-text databases available to more and more people. The impact was profound. As Clifford Lynch once remarked, "other than the ATM [automated teller machine], the online catalog was the first interaction that many faculty and students had with technology for information access."

Of course, then came the Internet, and everything changed again. Search engines emerged that accessed full-text data, but it was now HTML-coded Web pages. Both the pages and the search engines that retrieved them were created and made available by people from all over world. The calculus of information retrieval was profoundly altered. The primary locus of information dissemination is no longer the exclusive province of the library.

Have you looked at the library resources in courseware management systems lately? Look

*continued on page 10*

Illustrated by Leon Zernitsky

# TDWI 2002

## The Definitive Source for Data Warehousing & Business Intelligence Education & Training

TDWI is dedicated to educating business and information technology professionals about the strategies, techniques, and tools required to successfully design, build, and maintain data warehousing and business intelligence solutions. TDWI Conferences, Seminars, and Onsite Courses provide a comprehensive source of the highest quality education on the market today. In 2002, TDWI will continue to bring you unbiased, hype-free education for every member of your data warehousing or business intelligence team.

### 2002 TDWI Conference and Seminar Dates and Locations

**TDWI World Conference—Winter**
New Orleans Marriott - New Orleans, LA
February 17–22, 2002

**TDWI Seminar Series**
Denver, CO
March 11–14, 2002

**TDWI Seminar Series**
Minneapolis, MN
April 8–11, 2002

**TDWI World Conference—Spring**
Hyatt Regency San Diego - San Diego, CA
May 12–17, 2002

**TDWI Seminar Series**
Chicago, IL
June 3–6, 2002

**TDWI Seminar Series**
Boston, MA
July 22–25, 2002

**TDWI World Conference—Summer**
Bally's Las Vegas - Las Vegas, NV
August 18–23, 2002

**TDWI Seminar Series**
Washington, DC
September 23–26, 2002

**TDWI Seminar Series**
San Francisco, CA
October 7–10, 2002

**TDWI World Conference—Fall**
Opryland Hotel - Orlando, FL
November 3–8, 2002

**For more information please visit: www.dw-institute.com**

THE DATA WAREHOUSING INSTITUTE™
no hype. no fluff. no bias.

**The easy choice for computing solutions.**

Purchase technology quickly and conveniently with CDW•G contracts.

California CMAS # 3-99-70-0793B

California C-Smart K-12 Macromedia Contract

Commonwealth of Virginia PC Contract # VA-010525-CDWG

E-rate Spin # 143005588

Kansas Statewide HP Server Contract # 04076

Massachusetts Higher Education Consortium (MHEC)
*Telecommunication/Networking Products Contract* # F8
*Software Contract* # F04

Mississippi Express Product List #EPL 3244

New Hampshire Statewide Computer Hardware Purchases Contract # 622542

Ohio SchoolNet Plus, Round 5 Contract Vendor

Ohio State Term Schedule # 533114-0

Oregon Educational Technology Consortium (OETC) Microsoft Select LAR

PEPPM 2001-2002 Awarded Vendor

South Carolina Statewide Term Contract for Personal Computers # 02-54637-A7688

State of Wisconsin Microcomputer Software Contract # 15-39720-201

Texas QISV # 1-36-423-0110-800

Utah PC Stores Contract # GM2904

CDW•G Corporate Headquarters
230 N. Milwaukee Ave.
Vernon Hills, IL 60061

CDW·G™ *Computing Solutions Built for Education™*
888-239-7282
www.CDWG.com

© 2002 CDW•G All rights reserved.
CDW•G 7866-2SYL 03/02


## Trends, *continued from page 8*

again. There isn't much of what you might consider "library material" there. What might library materials useful for online learning look like? Examine the richness in the offerings from the library itself and you'll begin to get an idea.

To be fair, the reasons library resources are absent from courseware tools aren't entirely external to the library. Libraries have traditionally operated on the assumption that there is added value for users to come through the library for services. Yet it is becoming clearer all the time that faculty and students may not find the same value proposition. Librarians can and do provide added value to students looking for material from collections as well as from the Web. But people building the courseware infrastructure, as well as the courseware modules, don't know what services to expect—or in programming terms, to "call"—to integrate library resources, materials, or special functions into their courses.

Librarians need to think hard about what services they wish to deliver to online environments and clearly articulate how they might be accessed from courseware systems. This requires a radical shift in thinking because "calling" a resource says nothing about the behavior it will exhibit when it appears at its destination. Until libraries begin to think in terms of services they can offer courseware developers, it is not likely they will find a home in these tools.

It won't necessarily be for lack of interest, though I don't see a deep understanding of what library resources are from courseware vendors, either. Nonetheless, libraries must decide on their suite of services and define clear mechanisms by which they can be invoked in support of a learning process or in courseware environments. Doing anything less will only accelerate their disappearance from the experience of our students. That would be the least desirable of the potential future outcomes for online learning.

### Moore's Law Superceded

If you needed any more confirmation that things are moving more rapidly than ever in the world of technology note this: Intel has demonstrated CPU microprocessor performance of up to 10 GHz at room temperatures. Moore's Law, which predicts a rough doubling of computing speed every 18 months, is starting to appear as a quaint anachronism.

What's happening? Moore's Law was predicated on processing speed increasing in proportion to the number of chips one could pack onto the silicon wafers making up a CPU. Recently, however, that shrinkage has gotten out of whack. Specifically, chip designers have been able to accelerate the size reduction in one particular aspect of the chip fabrication process, the distance between gates in adjacent transistors. This so-called physical gate length has shrunk in the most advanced chips to 90 nanometers. Given that an atom is about 4 nanometers wide, that's a distance of about 360 atoms.

The International Technology Roadmap for Semiconductors—a group of industry manufacturers and suppliers, government organizations, and universities—predicted just two years ago that physical gate lengths would decline to 140 nanometers in 2002. The fastest Intel Pentium 4 chips currently run at 2.2 GHz, with portions of the chip zipping along at 4.4 GHz. Intel announced at the February International Solid State Circuits Conference in San Francisco 10 MHz speeds for these CPU parts.

With processing power expanding faster than Moore's Law, how might we use it beyond running word processors at lightening speeds? The most power-hungry applications continue to be things like speech recognition. With computational power of this magnitude, it won't be too long before the human/computer input interface switches from digits to discourse.

### Reference Links

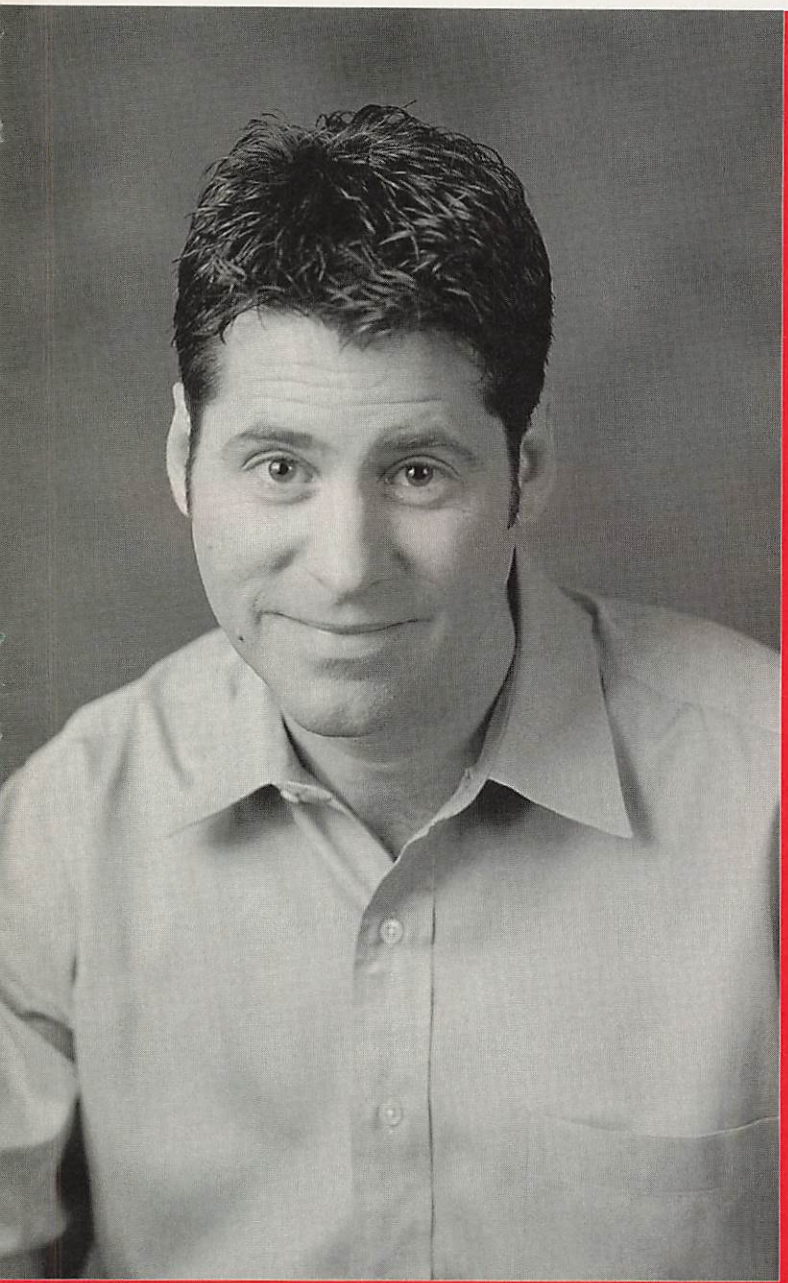
**International Technology Roadmap for Semiconductors**
public.itrs.net.

The ITRS identifies the technological challenges and needs facing the semiconductor industry over the next 15 years.

**International Solid State Circuits Conference**
www.isscc.org/isscc

# "Just order the standard computers."

Translation: By standard I mean configured just like mine.



## At CDW•G, we understand what it can be like to purchase technology.

That's why we offer all the brand name technology solutions you might need. Like software, PCs, storage, networking, telephony and more. Plus, all the services to support them. You name it and we've got it.

**One-Stop Solution:** From systems software to networking, we'll get you what you need. And most in-stock orders are shipped the same day.

**Personal Expertise:** You'll work with a dedicated account manager and a team of product experts that will get to know your school's needs.

**Reliable Resource:** You'll get technical expertise to support every purchase with the backing of a Fortune® 500 company that is ISO-9001;2000 certified.

www.CDWG.com 888-239-7282

CDW·G™

*Computing Solutions Built for Education™*

©CDW•G All rights reserved. CDW•G 8733SYL 3/02

# A BRIDGE TO THE FUTURE

## OBSERVATIONS ON BUILDING A DIGITAL LIBRARY

*By Marianne I. Gaunt*
*Rutgers University Libraries*

Over the past few years, academic libraries throughout the world have been in a state of transformation as a result of the impact of information technology. No area of the library has remained untouched. The impact on collections, services, staff, and facilities has had major ramifications on budgets, planning, and training. The experience of Rutgers University Libraries illustrates the extensive planning, work effort, possibilities, and investment required to develop the digital library.

In the fall of 1997, the Rutgers University Libraries embarked on a strategic planning process to define how the libraries would operate in the subsequent five years, the length of time participants in the process could describe a future impacted by rapidly changing digital technologies. A steering committee was formed, composed of faculty from a variety of disciplines, undergraduate and graduate students, several key administrators, and librarians. The committee spent nearly a year examining the ways that the library system could best serve its users: 48,000 students and 2,600 faculty across three major campuses, along with a growing complement of off-campus educational sites and remote users.

### Planning with the Community

The result of the committee's work was a planning document (www.libraries.rutgers.edu/rul/about/long_range_plan.shtml) describing how the Rutgers Digital Library Initiative will preserve and build on the traditional strengths of the library—its scholarly resources and services—while developing the digital library of the future. The process of developing the plan was critical for university understanding and buy-in to a new sustainable library model.

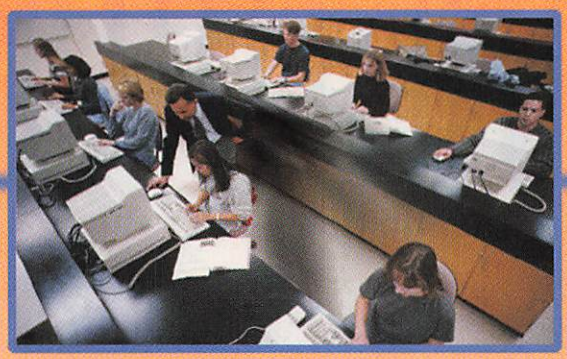
In 1997, electronic journals were just beginning to take hold and information technology was being incorporated into the classroom. Many faculty, especially in the humanities and social sciences, were wary of the library's reducing the monograph budget significantly, dropping print journals, and spending time on dubious digital projects with teaching faculty. The ability to discuss the changing information environment, its potential for positive impact on teaching, learning, and research, and the greatly enhanced services that it might facilitate was necessary to building consensus on how to move ahead.

The plan, widely distributed to the community and referred to as we build the future, was also the basis for a university-wide budget advisory

WHAT IF YOU COULD

SET THE PACE

WITHOUT PACING YOUR CLASSROOM?



*Imagine having control over all the stations in your computer lab.* Without roaming the classroom, you could evaluate the progress of each student and show your work (and theirs) on all monitors. You could lock the keyboards, blank the screens, and control the pace of your class without pacing the room.

It's all possible with the right tools — the LINK Systems® line of products from Applied Computer Systems, Inc.

How much more effective could you be? Find out by calling us to request more information—or to try a free 15-day demonstration. We'll send you actual instructor and student units so you can see just how easy it is to set up and use our LINK Systems® products.

LINK® SYSTEMS

800-237-5465
acs@ecr.net
www.acs-linksystems.com

committee to recommend a funding model for university contributions, library re-allocation, and external fund raising to support the DLI.

In each of the years since the plan's inception, the libraries have re-allocated funds to collection development, in particular, and raised nearly $2 million in external funds, while the university has contributed $16.6 million over that same time period for collections, equipment, and capital renovations. Having a rational plan that is widely known and accepted, and by which impact and success can be measured, is a very powerful tool.

### Goals and Considerations

While our libraries will have both print and digital resources, the DLI's goals focus on developing a user-centered information technology infrastructure across all university libraries (currently 14 physical buildings on 3 campuses). This includes designing more effective services that capitalize on technology; acquiring, organizing, and disseminating high-quality digital content; creating new multimedia content with other faculty colleagues; experimenting with digital preservation; and continually assessing and evaluating the impact of information technology, making appropriate changes in the provision of services and information resources.

In the first years of the DLI, the libraries have made much progress in implementing more effective user services with technology. There is a strong Web presence, online forms for requesting library materials and recalling books, circulation notices sent via e-mail, online reserves, and e-mail reference services. The libraries acquire and license excellent digital content (more than 6,000 full-text journals, 100 databases, and 96,000 monographs) and partner with faculty in creating databases and new instructional materials. (A few examples of the digital library resources that can be accessed on the Web are: Learning Links for Spanish Language Acquisition, the Eagleton Public Opinion Poll, Medieval and Early Modern Databank, New Jersey Environmental Digital Library, Electronic New Jersey, and the Women in Leadership Database.)

The processes of acquiring and creating digital content and services as we develop the DLI have highlighted both practical and theoretical considerations that are not unique to Rutgers, nor to any library that is re-creating itself in the digital environment. A few of the key areas are examined below.

**Organizational Structure.** The Rutgers model for an organizational structure to support digital library development reflects both the institutional and library culture. While geographically dispersed across the state in three major campuses, the libraries and the university work closely as one system. All committees and efforts are composed of librarians and staff in many units. As a result, we have avoided limiting expertise to a designated few while the rest remain in the print environment.

There are leader groups, in the Scholarly Communications Center in New Brunswick, in the newly developing Margery Somers Foster Center on the Douglass Campus, and in the Center for Instructional Information Technologies on the Newark campus. But all librarians are engaged in some form of digital library development—Web page development, database creation, liaison with faculty on the design of new curricular materials, metadata standards implementation, electronic information acquisition, or improvement of access tools.

We have also seen a tremendous blurring of the lines between and among traditional library units. The acquisition of a new electronic resource requires the collection development, public services, cataloging, and systems staff to collaborate on bringing this resource to the community. Flexible groups and new workflow strategies are constantly being developed. Our partnerships with the university's faculty, Teaching Excellence Centers, and computing services have expanded, and our statewide and regional partnerships have grown in importance.

**Staff Development Needs.** Because our future is working with digital technologies, ongoing skills development for every staff member is critical. We realized early on that the libraries would need to focus on training and development more closely. As a result, a library committee developed a report (www.libraries.rutgers.edu/rul/staff/staff.shtml) that recommended the new position of training and development coordinator. While technical skills training is important, soft skills for working in teams and project management expertise are becoming increasingly important as we work collaboratively to design and implement new services and content.

Hiring and retaining good staff have become more competitive. As the level of sophistication of our services and collections rise, our ability to maintain and improve on them requires a growing number of staff with an increasing level of expertise. We have used student assistants very successfully, but a core infrastructure is essential to manage a sophisticated operation.

While we attempt to maintain a good level of technical expertise for all staff, we have converted some positions to higher level technical support to maintain the infrastructure and support database creation and management. Re-allocation of staff to the systems support area may come from areas where certain functions are declining, such as circulation and serials check-in. This area will continue to require constant monitoring and budget support.

**Facilities and the New Digital Infrastructure.** The digital infrastructure has had a major impact on the physical environment of libraries. Many libraries have seen both the monograph circulation and physical use of their library buildings decline. This is due, in part, to the successful delivery of services and collection content over the Internet. What we are now seeing is a different need and use of the facilities. To a


# ›Automate your SCT Banner® Processes
## With the smarter scheduler from AppWorx.

**AppWorx is the smarter choice for enterprise scheduling.**

| | |
|---|---|
| **Efficient.** | · Utilize the only proven enterprise scheduler integrated with SCT Banner.<br>· Streamline Banner business processes.<br>· Simplify output management and distribution of Banner reports. |
| **Powerful.** | · Reduce processing errors by eliminating manual procedures.<br>· Simplify Banner job sequencing and complex conditions.<br>· Maximize resources through advanced queuing and workload balancing. |
| **Smart.** | · Centrally manage all Banner ad hoc and scheduled jobs.<br>· Leverage real-time data to automate Banner processes.<br>· Dynamically resubmit failed jobs, minimizing recovery time. |

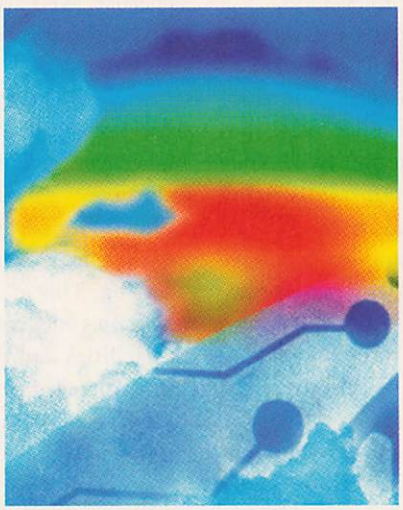
AppWorx
Smart Solutions for Enterprise Scheduling.

1.877.APPWORX or www.appworx.com

See us at SETA booth #10, and at SCT Summit booth #201

certain extent, open access computing labs remain necessary for those students who wish to do their work near related print resources and competent information staff. As students work more collaboratively, group study/work spaces and rooms equipped with technology are being requested.

Staff space has been impacted equally. Digital project and consultation space is essential. Where grant funds bring temporary assistance, unassigned workstations are necessary. Flexibility in network wiring and wireless technology must be incorporated into the design of all libraries. The costs of maintaining and upgrading the technology infrastructure, including equipment, has risen dramatically in the last several years. Electronic databases cannot be accessed on ancient equipment; staff cannot work effectively without the proper tools.



**Electronic databases cannot be accessed on ancient equipment; staff cannot work effectively without the proper tools.**

**Metadata Standards/Interoperability.** As the amount of digital information grows exponentially, it becomes increasingly apparent that our users will need to search across multiple databases and drill down into needed content. The development of such projects as the Open Archives Initiative (www.openarchives.org), which is developing a metadata protocol "to supply and promote an application-independent interoperability framework that can be used by a variety of communities who are engaged in publishing content on the Web" is a critical contribution to digital libraries. The developers of digital content must have core standards that include preservation and digital rights associated with them. As libraries develop digital content, these standards must be firmly in place and built upon.

**Digital Collection Development.** When most libraries began to create digital content, the impetus came from a number of areas: a desire not to be left behind, opportunities presented by funding sources and/or faculty interest, a need to develop local expertise, the desire to bring special collections to a broader community, or the hope of preserving the physical artifact. While all these interests are worthy, the long-term implications of the costs/benefits of creating and maintaining digital collections now must be seriously reviewed.

The Commission on Library and Information Resources (CLIR) has provided some guidance to digital project developers (www.clir.org/pubs/cliringhouse/house02.html). The document asks for specificity of purpose and the identification of those who will benefit; the determination of all costs at the outset; a description of the value added by digitization; and how the materials will be selected and the project maintained over the long term. Because digital projects require a significant investment of resources, CLIR recommends that libraries consider collaborations with other libraries, archives, and centers in the development of new digital collections.

**Copyright and Intellectual Property.** Often a digital project is chosen or rejected because of copyright issues surrounding the use of the materials. This area is still in flux as new legislation that extends copyright ownership and interpretations of the Digital Millennium Copyright Act are argued before the courts. Many libraries engage in useful projects based on their special collections, or try to negotiate with copyright owners, or create entirely new digital content. While there is limited flexibility in this area, it is important to support initiatives, such as the open archives movement in order to make more information freely available; to be diligent in monitoring new legislation that impedes open access to information; and to educate the user community to fair use.

## Assessment in a Changing Environment

As we venture into a more digital environment, many of the traditional measures of an excellent library have become eroded. How will we know that we have been successful and what benchmarks might we use to compare ourselves with peer institutions and against ourselves? The Association of Research Libraries has developed a New Measures Initiative (www.arl.org/stats/newmeas/newmeas.html) that is testing new measures of effectiveness.

The Rutgers University Libraries have created an assessment committee to continuously evaluate what we are doing. The committee has conducted user surveys about general satisfaction, electronic reserves, and electronic collections. These surveys are just the beginning of a broad-based assessment of how the digital environment created by our libraries is affecting the research, instructional, and learning functions of our university.

If it is to be sustainable over time, strategies used to support a digital library need to be adjusted from time to time. We need to continue to weigh how we can best respond to the changing information needs of our user communities and refine attributes of our digital services and resources.

*Marianne I. Gaunt is the university librarian at Rutgers.*
***gaunt@rci.rutgers.edu***

*Twenty-Fourth Annual*

# International Conference on Teaching and Leadership Excellence

*hosted by the*

*National Institute for Staff & Organizational Development (NISOD)*

## May 26-29, 2002
## Austin Convention Center
## Austin, Texas

**Wilhelmina Delco**
Adjunct Faculty, The University of Texas at Austin, and Former Texas State Representative

**Vincent Tinto**
Chair, Higher Education Program, School of Education, Syracuse University (NY)

***Vocal Performances by***
**Arnette Ward**
President, Chandler-Gilbert Community College (AZ)

***Peña Art Exhibit hosted by***
**Amado Peña**
Renowned Southwest Artist

- ✯ Successful teaching strategies
- ✯ Special sessions for department chairs
- ✯ Leadership development seminars
- ✯ Team-building and networking activities
- ✯ Hands-on Gateway lab
- ✯ Exciting exhibit hall with ongoing activities throughout conference
- ✯ Excellence Awards Celebration

Join more than 2000 college faculty, presidents, vice presidents, deans, directors, chancellors, and department chairs who actively support the highest standards of teaching excellence and promote student success.

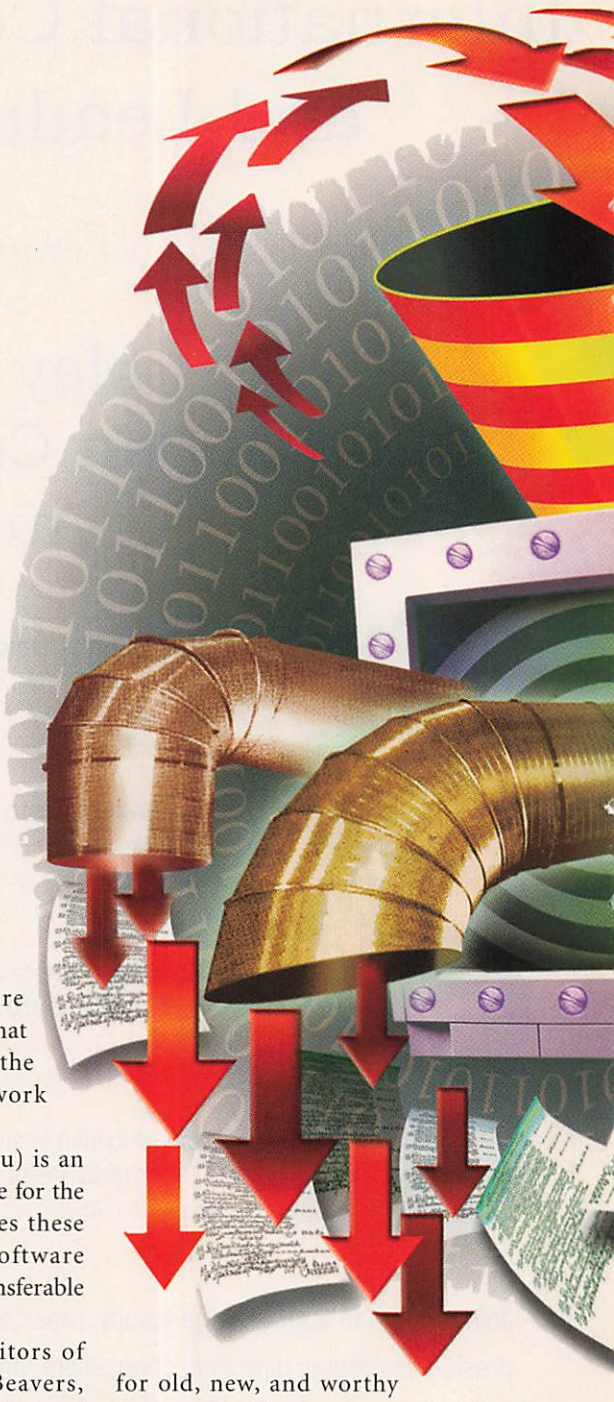
**Online Registration**

# www.nisod.org

# Noesis:

## Is it a library with built-in searching or a search engine with a built-in library?

*By Peter Suber, Earlham College*



Illustrated by Bek Shakirov

Every discipline has a rapidly growing body of literature on the Web. Many hard-working volunteers in every field have built Web directories of this literature. Some have even built discipline-specific search engines. As the scholarly content on the Web grows, life gets more and more difficult for these directory and search engine editors. Think about the problems they face. They must try to cover the field, or their own topic within the field, comprehensively. They must distinguish worthy literature from unworthy. They must discover new sites within a reasonable time and add them if they are worthy. They must fix or delete dead links. The directory editors must organize their contents to help users navigate. If they can, they should offer searching, not only of the links and their annotations, but of the full-text files to which they point. Finally, they must use methods that scale up as the relevant body of literature continues to grow. Methods that worked five years ago when the Web was small no longer work today.

Noesis (noesis.evansville.edu) is an online library and search engine for the field of philosophy that solves these problems. Moreover, the software enabling it to solve them is transferable to any other discipline.

I'm one of the two co-editors of Noesis. My partner, Tony Beavers, deserves the credit for envisioning and implementing the features of this powerful software. In what follows, I can make immodest claims for Noesis because I'm praising Tony.

### Noesis Today

Noesis has a board of topic editors, each with a different specialization within the field. The topic editors are responsible for monitoring their corners of the field for old, new, and worthy content. The Noesis software gives them a Web form for adding sites, which is much easier than writing HTML code or sending e-mail to another human editor who then writes HTML code. (Noesis also gathers new content by inviting user submissions, which are evaluated by the editors.) Topic editors may organize their topic area according to the sub-topics of their choice. Users can browse or search the entire Noesis

collection or any sub-collection produced by an individual editor. By dividing the labor among the editors, an entire discipline can be covered comprehensively and kept up-to-date. If one editor has too large a topic to cover adequately, then we only have to divide the topic and add another editor.

### Gateway Selection Filters

Noesis uses several kinds of peer review to identify and recommend worthy sites. The first is at the gateway, when editors use their professional judgment to decide what deserves to be included. In addition to the criteria invoked in the gateway decisions, Noesis currently requires (with a few exceptions) that the texts be written by Ph.D.s. As we'll soon see, Noesis supports other, higher kinds of quality control that sort out the better from the worse among the texts that make it into the collection.

### Adjustable-Scope Searching

Searching is the glory of Noesis. Because Noesis stores all its texts in a database, it can index them for searching much more quickly than a traditional search engine can crawl a series of Web sites. For the same reason, it can fine-tune the construction of the index. Traditional searchable collections only support all-or-nothing searching: if a file contains the search string, then a link to the file appears on the hit list, and otherwise not.

But Noesis is an adjustable-scope search engine. Users can search the whole collection, any sub-collection created by a topic editor, the collection of works by a given author, the collection of works from a given journal or set of journals, or the custom collection created by the user. Noesis also classifies its texts by genre (essays, reviews, course syllabi, and so on) and lets users filter any search by genre. Finally, editors only need to collect links to desirable texts; Noesis will automatically provide full-text searching of those texts.

Adjustable-scope searching allows users to add another layer of peer review to their research. If you trust the peer review judgments made by the editors of journals A, B, and C, then you can set the scope of Noesis to search just those journals.

When updating its search index, Noesis automatically purges dead links. The next version of the software will put dead links in a special offline graveyard for post-mortem analysis. Most of the time, dead links mean that content has been moved, not deleted. With a little effort, the new location can be found and the link revived.

## Noesis Tomorrow

The version of Noesis now online is 2.0. Noesis 3.0 will have two key features that we've already proved to work, so it's not premature to sketch here how they could enhance research.

I said that in 2.0, users could create a custom collection to help organize and search a subset of the master collection. A custom collection could contain texts relevant to a course, a dissertation, or an essay.

In Noesis 3.0, user control over custom collections is set free to flourish. The first key feature in 3.0 is that users can create as many custom collections as they want. That might mean one for each course, each essay, each research interest. By default, all Noesis collections are public, so the collections you make for your courses can be used by your students. Each collection has a unique URL, making it easy to tell your students where to look.

At first only Noesis-approved editors will have the authority to add new items to the master collection—i.e., to make the gateway decisions about relevance and worth. Other Noesis users will only be able to make custom collections from the items in the master collection.

But eventually all users will be able to make Noesis collections from any content anywhere on the Web. We can give up the gateway control because Noesis will contain other, more effective forms of peer review and quality control.

### Collection Building

The second key feature in Noesis 3.0 is that users can "adopt" collections built by other users. If you build a collection on Plato, and another scholar builds one on Aristotle, then I could start a collection on Greek philosophy by adopting both of these pre-existing collections (see Figure 1). You retain control over your Plato collection and update it whenever and however you like. When you do, my collection subsuming it is automatically updated.

This allows a team of scholars to divide the labor of covering a large subject like Greek philosophy. The final collection on Greek philosophy can be searched as a whole by users who don't know and don't care how it is constituted. The sub-collection on Plato is a bona fide, separately searchable Noesis collection that might in turn have adopted smaller sub-collections.

The result is that editors of large collections can make their collections comprehensive and up-to-date without monitoring the whole field themselves, and can make their collections authoritative without being experts in every sub-topic. If Noesis 2.0 is about searching, Noesis 3.0 is about modularity and cooperation in making collections worth searching.

If the editors of an online journal took control over the Noesis collection of its articles, then they could decide its internal structure—e.g., sub-collections for research articles, review articles, letters, sub-collections by year, and so on. They could also put the Noesis search box for their collection on their journal's Web page. Other Noesis users could adopt their collection when building larger disciplinary collections.

### Expert Quality Controls

Noesis users can become editors or peers for the purpose of peer review. When they build a custom collection, they are endorsing the texts they choose to include. The result can be an online journal, encyclopedia, "virtual reference shelf" for a course, or full-text bibliography for an evolving essay.

What's important to other Noesis users is not just that you've built a collection on a certain topic, but that you've done so with certain standards. If your collections are miscellaneous or heedless of quality, others will tend not to adopt them. If I trust your judgment about Descartes or Kant, then I might adopt your Descartes collection into my larger collection on epistemology. If I decide later that someone else has a better Descartes collection, I can adopt it too or I can remove yours and add the new one. Adopting one collection into another (see Figure 1) uses the same drag and drop interface as adding URLs to a collection, shown in Figure 2.

**Figure 1: Adopting small collections into larger ones**

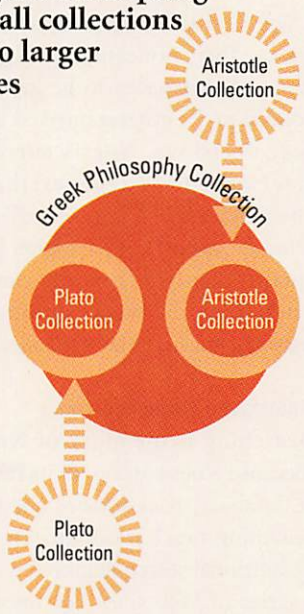
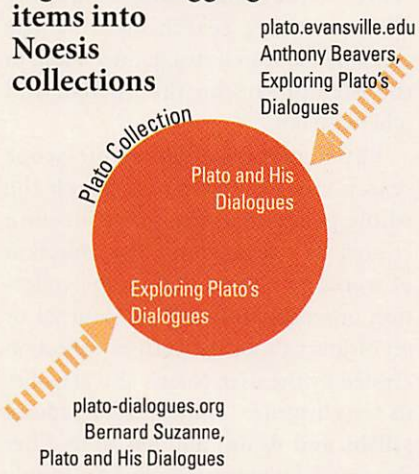



**Figure 2: Dragging items into Noesis collections**




Noesis 3.0 will start with a digital library of philosophy, inherited from Noesis 2.0 and supplemented by the index of Hippias (hippias.evansville.edu) and my Guide to Philosophy on the Internet (www.earlham.edu/~peters/philinks.htm). Tony and I will nurture Noesis libraries in a few other disciplines, such as ancient history, religion, and law, and encourage volunteers to use the software to build collections in any discipline. Noesis collections will be adoptable into other collections regardless of where they reside on the Internet.

The most scalable way to build large, long-term, up-to-date, authoritative digital libraries that cover entire disciplines is to let individual experts build individual Noesis collections on the topics of their expertise. Other users can yoke these together in any combination. From this natural Noesis activity will emerge strong collections on Greek philosophy and epistemology, for example. These can become components for larger collections that cover all of philosophy. Researchers on a multidisciplinary topic, such as racism, could build the collections they need, for example, by dragging together collections on economics, sociology, politics, and law.

### Emergent Peer Review

Finally, Noesis can harness user activity to create what we call emergent quality control or emergent peer review. If a certain article has been adopted by three collections, then it has three endorsements. This is a start, but only a start, because it only counts votes without weighing them. If one of the collections adopting the article has itself been adopted by other collections, then the collection editor is not just an endorser but an endorsed endorser. If the author of works in the Noesis master collection is also the editor of one or more custom collections, then endorsements of the author's works can increase the weight of the author's endorsements.

In both of these ways, and in many others, we can start to weigh votes and find the works most endorsed by the

most endorsed endorsers. There's no reason not to put some of these parameters under user control and allow them to turn a "quality knob" in order to get fewer hits of higher quality or more hits of mixed quality. Once the structure is in place, "quality zooming" will be at every researcher's fingertips, including novice researchers who need it most.

Noesis can use this information to create special collections on its own, say, the cream of the crop on Plato, as determined by collective user activity but not by any individual user. It can also use it to sort search hits. When you search for Plato, you can sort hits by relevance, date, or by Noesis-determined quality.

Noesis collections not only carry several kinds of built-in quality controls; they also solve the problem of information overload. When users search Noesis collections on relevant topics rather than turn to general search engines, they will find only relevant hits and no false positives. Searching a Greek philosophy collection for "Plato" will return hits about the philosopher and none about the software or the town in Illinois.

Tony and I are committed to making Noesis available to ordinary academic users (collection builders and collection searchers) free of charge. If we ever charge for it, we'll charge users who want advanced features or businesses that want a commercial version to manage their proprietary information. The first purpose of revenue will be to subsidize the free Noesis services.

### Noesis and the Free Online Scholarship Movement

Like most search engines, Noesis can only link to texts that are freely available on the Web. It can't see texts behind passwords accessible only to paying subscribers of a journal or database. Like most search engines, we don't see this as a limitation. However, our rationale for not seeing this as a limitation differs from that of most other search engines. We don't aspire to comprehensive coverage of the general Web. We aspire to be one of the premier tools for organizing and searching free online content, especially academic content. We aspire to be such a useful tool that content now in print or now online behind passwords has one more reason to move into the free online sector where it can be picked up, organized, and made visible by Noesis.

There is a growing movement to publish scientific and scholarly literature, especially journal articles and preprints, on the Internet and to make them available to readers free of charge. The movement is fueled in part by the exorbitant and rapidly rising costs of print journals, partly by the unprecedented opportunity for virtually cost-free worldwide dissemination afforded by the Internet, and partly by the venerable tradition in which scientists and scholars write journal articles and preprints without expectation of payment.

Progress occurs in this movement whenever a journal makes its contents freely available online or a university creates a free online archive for the


Join Emerging Leaders in the Learning Technologies

Master's and doctoral programs are offered online, supported with face-to-face sessions in West Los Angeles, national, and international locations.

**Program Director**
Linda Polin
Professor of Education
One of the leaders and creators of Pepperdine's online programs, Polin has a deep and rich understanding of how to make the tools of technology adapt to human learning. The key: Creating a friendly atmosphere of communication that opens students to ongoing thought and discussion. "The sun never sets on the Net. Our students are online and learning all the time."

**Alumnus**
Sheila Booker
Project Manager, Carrera-MAXIMUS
In the past, Booker has used her skills to provide computer training for the underprivileged. In her present job, she continues her goal of empowering people by implementing computer software services for Portland, Oregon public schools.

M.A. in Educational Technology, Online
Ed. D. in Educational Technology
Ed. D. in Educational Leadership, Administration, and Policy

(800) 888-4849
http://gsep.pepperdine.edu

PEPPERDINE UNIVERSITY
GRADUATE SCHOOL OF EDUCATION AND PSYCHOLOGY

research articles by its faculty. Making these collections free and online solves part of the problem. The rest of the problem is to find what you need in these separate collections. Each is separately searchable, of course. But researchers shouldn't have to run separate searches at separate archives, let alone learn which ones are likely to contain literature relevant to their research interests.

### Standards and Cross-Archive Searching

One evolving strategy is a cross-archive search engine. The name explains the technology. As long as the separate archives conform to a basic standard—in this case, a metadata standard from the Open Archives Initiative (OAI)—then these special search engines can search all cooperating archives as if they were a single, grand archive. You needn't know which archives exist, where they are, or what they contain. As new ones come online, they are incorporated seamlessly, scaling up and supporting the division of labor in maintaining archives with different topical or regional specializations.

Noesis already does this—with Noesis collections. When a future version of Noesis can read OAI-compliant archives as if they were Noesis collections, and when OAI-compliant search engines can read Noesis collections, then Noesis will be a powerful force for accelerating the free online scholarship movement.

Noesis wants to be a simple but highly flexible tool for building, maintaining, and searching large collections of texts. But it wants to serve this function above all for free texts, to support free online archives and attract new content to them. A print journal may have many reasons for not migrating to the Web. But if one reason is that it will not be well indexed or visible to scholars in the field, Noesis will answer that worry.

If a group of experts wants to create a new, peer-reviewed journal on the Internet, then making it a Noesis collection will be by far the fastest and easiest way to do so, and the most convenient for readers and researchers. In both these ways, we want Noesis to create incentives to enlarge the body of online scholarship available to readers without charge.

## Free Online Scholarship Movement Resources

**The Free Online Scholarship Newsletter**
www.earlham.edu/~peters/fos/index.htm

**Open Archives Initiative**
www.openarchives.org

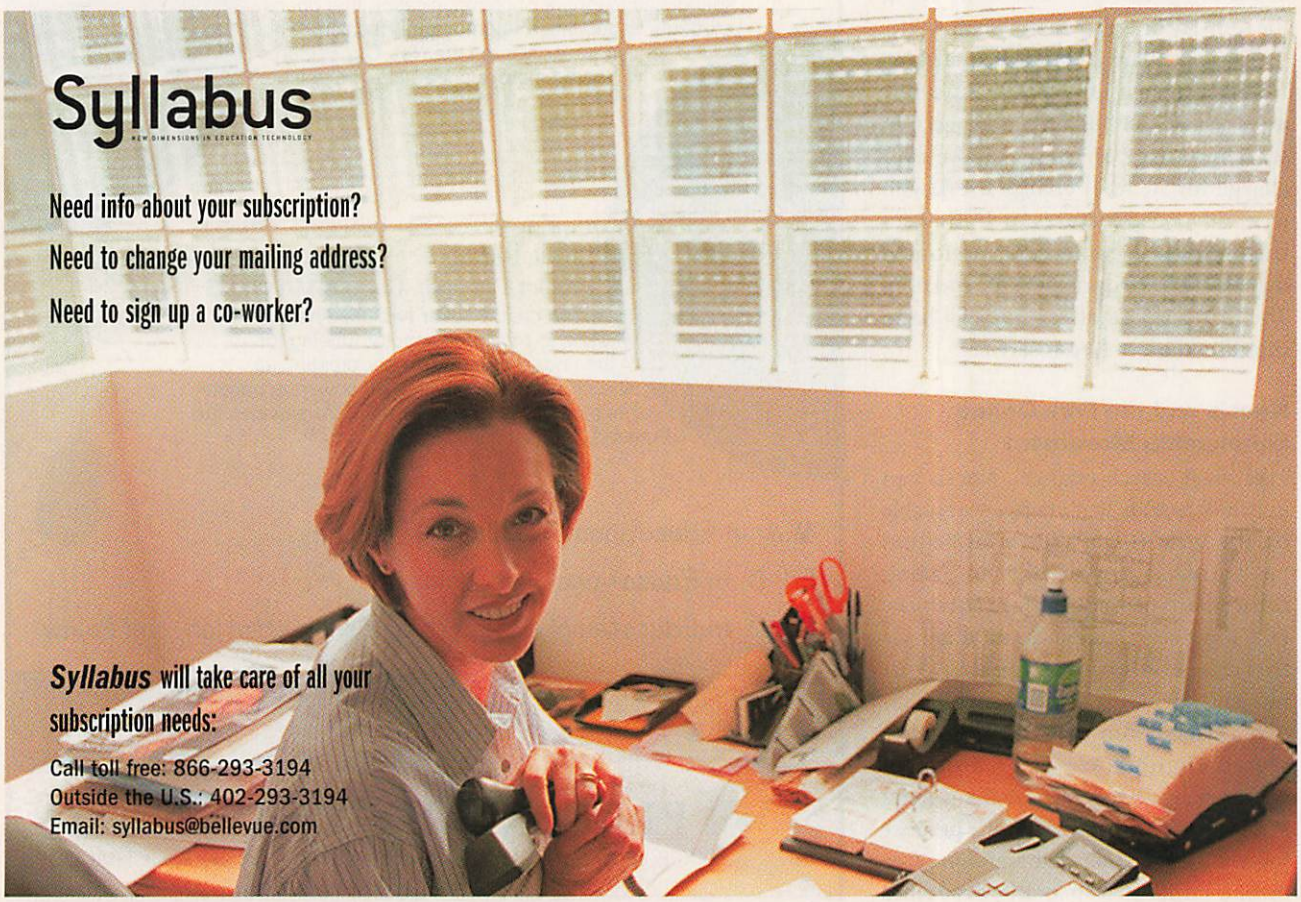
## OAI-compliant cross-archive search engines

**ARC**
arc.cs.odu.edu

**CiteBase**
citebase.eprints.org

**Torii**
torii.sissa.it/torii/index.jsp

***Peter Suber*** *is a professor of philosophy at Earlham College, editor of the* Free Online Scholarship Newsletter, *and co-editor of Noesis.*


Syllabus
Need info about your subscription?
Need to change your mailing address?
Need to sign up a co-worker?
Syllabus will take care of all your subscription needs:
Call toll free: 866-293-3194
Outside the U.S.: 402-293-3194
Email: syllabus@bellevue.com

**Sally M. Johnstone**

*As founding director of the Western Cooperative for Educational Telecommunications at the Western Interstate Commission for Higher Education, Sally M. Johnstone serves as a resource on higher education technology issues. She also serves on the board of the American Association for Higher Education, the U.S. Open University's Board of Governors, and the Advisory Panel for the Consortium for the Advancement of Private Higher Education.*
*sjohnstone@wiche.edu*

# Opting Out Online

Are students choosing distance learning instead of going to campuses? In October 2000, the National Association for College Admission Counseling sponsored the first U.S. Virtual University Fair. In the first 15 minutes, more than 5,000 students signed on and jammed the system. No one had expected this type of interest from traditional aged students.

These are the kids who go off to college to get away from their parents, meet new friends, drink beer, download music through their dorm high-speed Internet connection, and study. So why would there be so much interest in virtual universities?

As one of the research universities with which we work reported to me recently, there are a lot students sitting in their dorm rooms taking online courses. This particular institution had just learned that 85 percent of their online students were on their own campus as full-time students.

I was curious about why a student would go online for a class when they have the option of sitting in a room face-to-face with a faculty member. Here were some of the reasons I picked up:

• Scenario One. I have to work and I don't have a car. The only job I could get close to campus is in a fast-food place. Unless I want the late-night shift, I have to be there when they need me. The only lunchtime hours I could get this term were on Mondays and Thursdays. That pretty much knocks out middle-of-the-day classes that are set up for either Monday/Wednesday/Friday or Tuesday/Thursday. The only way I could take the courses I need this term was to take a couple of them online so I can control the schedule. It's working out pretty well.

• Scenario Two. I showed up for my calculus class this term, and there were more than 100 people in the lecture hall. The guy doing the teaching could barely speak English. I am not that good at math anyway, so I knew I would never be able to pass that course. I found an online calculus course that uses the same book and comes from another state university. It costs a little more, but my folks understand and are helping me with the extra tuition.

• Scenario Three. I am a nighttime person. I hate getting up early so I take the online classes. That way I can study at night and still be able to participate in class.

None of these reasons are surprising or even new ones. However, for the first time, students actually have other options. More and more institutions are recognizing this. Some faculty members are trying to integrate online experiences and options into their on-campus classes.

It is possible to imagine a future in which 18-year-olds go away to a campus for all the usual reasons, but once there, they will not have classes whose meetings are determined by the number of classrooms available that can hold all of the students registered for the class. Instead, they will meet with their professors in small groups, work on class projects in online groups, and progress toward their degree—not based on credit hours earned, but rather on the demonstration of the knowledge they master.

To get there, we have a lot of work to do. We have to develop a new framework for awarding credentials, re-tool the faculties of our colleges and universities.... On second thought, maybe we should just let the kids take some of their classes online.

Illustrated by Laird Campbell

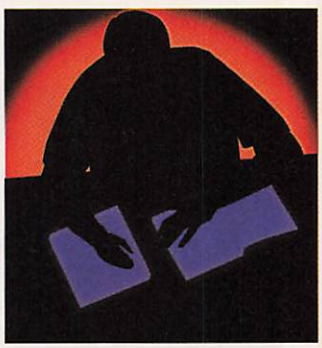
**David G. Brown**

*David G. Brown is vice president and dean of the International Center for Computer Enhanced Learning. He has served as president of Transylvania University, chancellor of the University of North Carolina at Asheville, and chair of several national groups, including the American Association for Higher Education and the Higher Education Colloquium. As provost of Wake Forest University, he founded the Annual Conference of Ubiquitous Computing Colleges and Universities, and founded the* Journal of Computer-Enhanced Learning. *brown@wfu.edu*

# Preview and Review

In the speech course I took from Lionel Crocker at Denison University, I was encouraged to "tell 'em what you're going to them 'em, tell 'em, and then tell 'em what you've told them." For me, this mantra transfers well to effective teaching.

With technology, we can add, "repackage the same message in different modes and with a rich array of examples," and "allow 'em to hear it again and again until they get it." And finally, in the spirit of interactive learning, "allow 'em to work with each concept, over and over—before, during, and after presentation."



As a preview technique, it's hard to beat having students read the textbook in advance. This can be reinforced in several ways. Each student can be asked to complete three to five questions on a multiple-choice "survey," with the results automatically recorded in Blackboard or WebCT. Or I might ask each student to e-mail me their "muddiest point" (see my November 2001 *Syllabus* column).

One of my favorite preview strategies is to ask Student A to draft a paragraph-long answer to a key question, e-mail the draft for refinement to Student B, and then have Student C further revise the paragraph, negotiate consensus approval with A and B, and submit the answer on behalf of all three students. Students are encouraged to teach one another, and my grading task is cut by two-thirds.

One of my colleagues, physicist Danny Shapiro, constructs "double-jeopardy" quizzes. Students are given a multiple-choice question. When they select an option (even the correct one), a counterargument appears on the screen. The student is then given the option of changing the original answer or writing a sentence or two in justification of their original choice. This is a wonderful pedagogical technique, one that closely simulates a discussion with a student in one's office, but I have found that well-constructed quizzes require many hours of preparation.

For review, Harvard University's Richard Lyman encourages all of us to use the "one-minute quiz." This works very well with or without technology. In my classes, all students are at networked computers and signed in to our chat room. Following a 20-minute lecture, I ask each student to prepare a one- or two-sentence summary of the concept-of-the-day. At the signal, they simultaneously submit their summaries to the chat room. Our in-class discussion will then typically focus on honing to perfection two or three of the best submissions. These alternate statements of the basic concept can then be used for still later review.

Another effective strategy is to ask students at the beginning of their next class to summarize what they learned during the previous session.

After class, assignments may include asking a team to construct their own Web page on the concept-of-the-day, requiring teams to develop PowerPoint presentations using the concept, writing one-page essays (either individually or as teams) describing how the concept is applied in the real world, or simply answering a few follow-up questions.

Another one of my colleagues in physics, Rick Matthews, has redesigned his in-class demonstrations into segments of 30 seconds or less, so they can be videotaped and digitized for later viewing and review.

As both preview and review techniques, repetition and involvement enhance understanding and facilitate retention.

Illustrated by Allison Cusato

**Steven W. Gilbert**

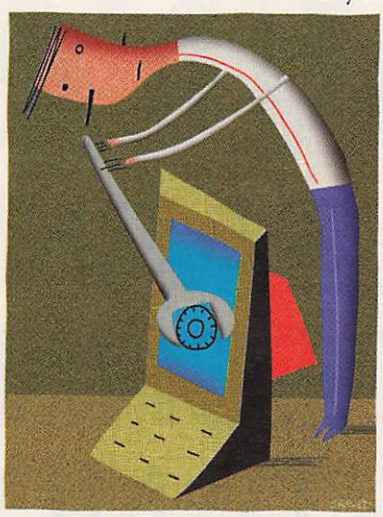
*Steven W. Gilbert joined the American Association for Higher Education as director of technology projects in July 1993. He founded the TLT Group as the Teaching, Learning, and Technology Affiliate of AAHE in January 1998. He was previously vice president of EDUCOM, where he created and led the Educational Uses of Information Technology program and the EDUCOM Software Initiative. He also moderates the Internet Listserv AAHESGIT.*
*gilbert@tltgroup.org*

# Let Students Be Your Tech Support

Student technology assistant programs are among the few approaches to supporting the improvement of teaching and learning with information technology that are both cost-effective and educationally sound.

A few colleges and universities have begun using their own students as one of their most valuable assets for providing more varied and complex technology-related support services for faculty and other students.

Such programs can enable you to use one of your institution's most valuable and often-overlooked unique resources—your students—to deal with a support service crisis. In return, students gain important job skills by learning to interact with both faculty and other students in a professional manner; they also have the opportunity to hone their technology skills.



There are many reasons for using information technology to improve teaching and learning. However, most of those efforts increase overall costs and increase the demand for support services in the areas of tech support, library services, professional development, and first-year student orientation. But using students as technology assistants or consultants shows the most promise for holding down costs while providing support services.

Expectations for improving teaching and learning with technology continue to accelerate, and the demand for services is outstripping budgets. In addition, a shortage of qualified staff makes it difficult to fill existing support positions. Part of your solution can be a large-scale program for training and using students to provide technology support for faculty, students, and staff.

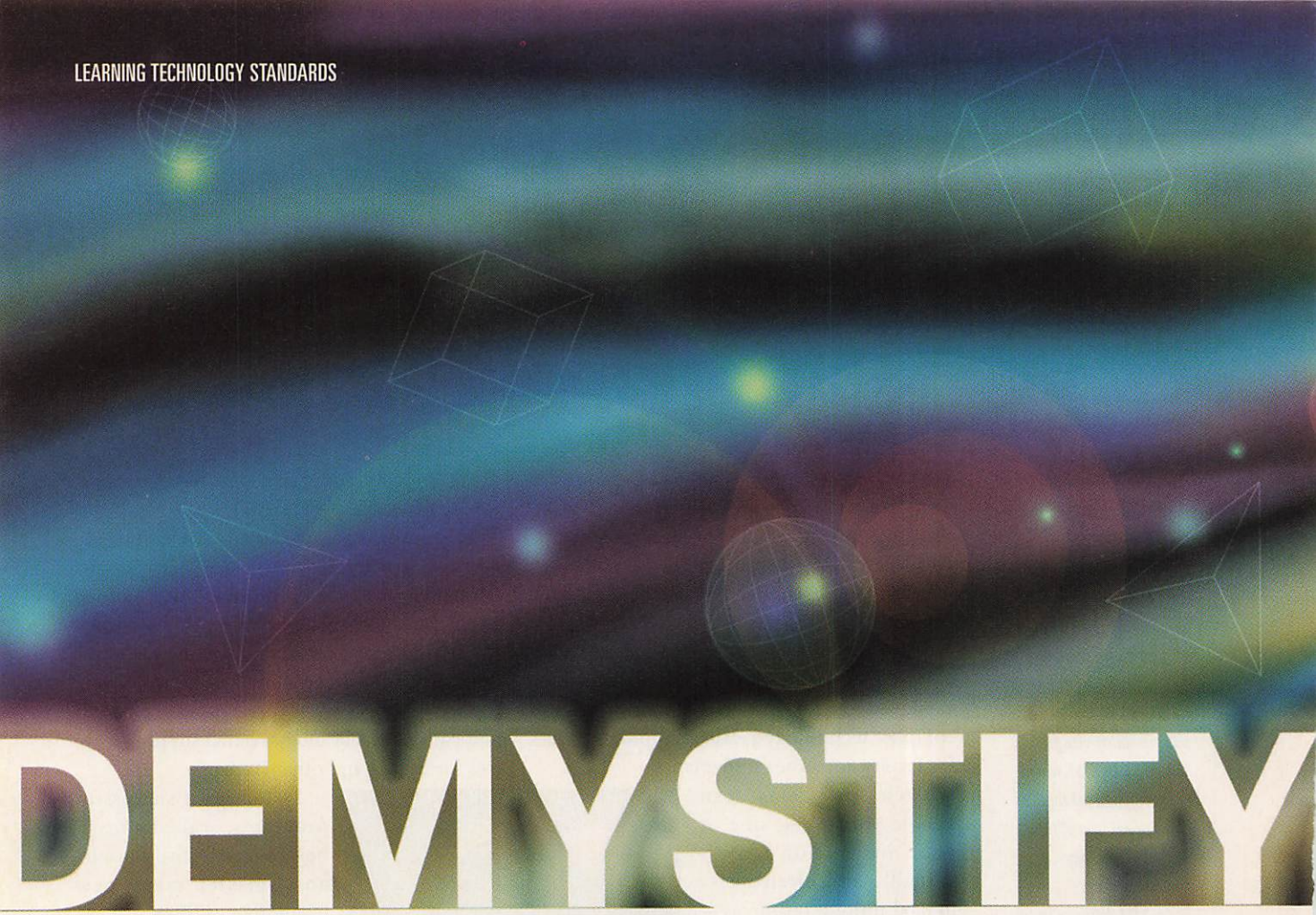
Hundreds of colleges and universities are already using students to "supervise" computer labs—that is, to make sure no one steals the computers while they do their own homework and to occasionally answer questions. But a few institutions have begun using their own students to provide more varied and complex technology-related support services for faculty and other students.

In the most successful programs, students learn how to be effective consultants, master many new technology skills, and have opportunities to train and supervise other students. In some cases, students even help introduce new instructional applications for technology to faculty members who are interested in expanding their teaching options.

In some programs, the structure enables a few professional staff members to supervise hundreds of student assistants because some of the students can provide much of the necessary leadership themselves. However, I have never heard of a staff position being replaced by the use of student consultants; instead, student helpers reduce the magnitude of the local workforce shortage.

Such programs exploit students in the most positive sense. Many participating students report that the jobs provide an excellent learning experience, good preparation for careers, more advanced academic work, and good opportunities to get to know faculty members more personally. The institutions gain good technical support at a cost lower than any other option.

Illustrated by Mark Shaver

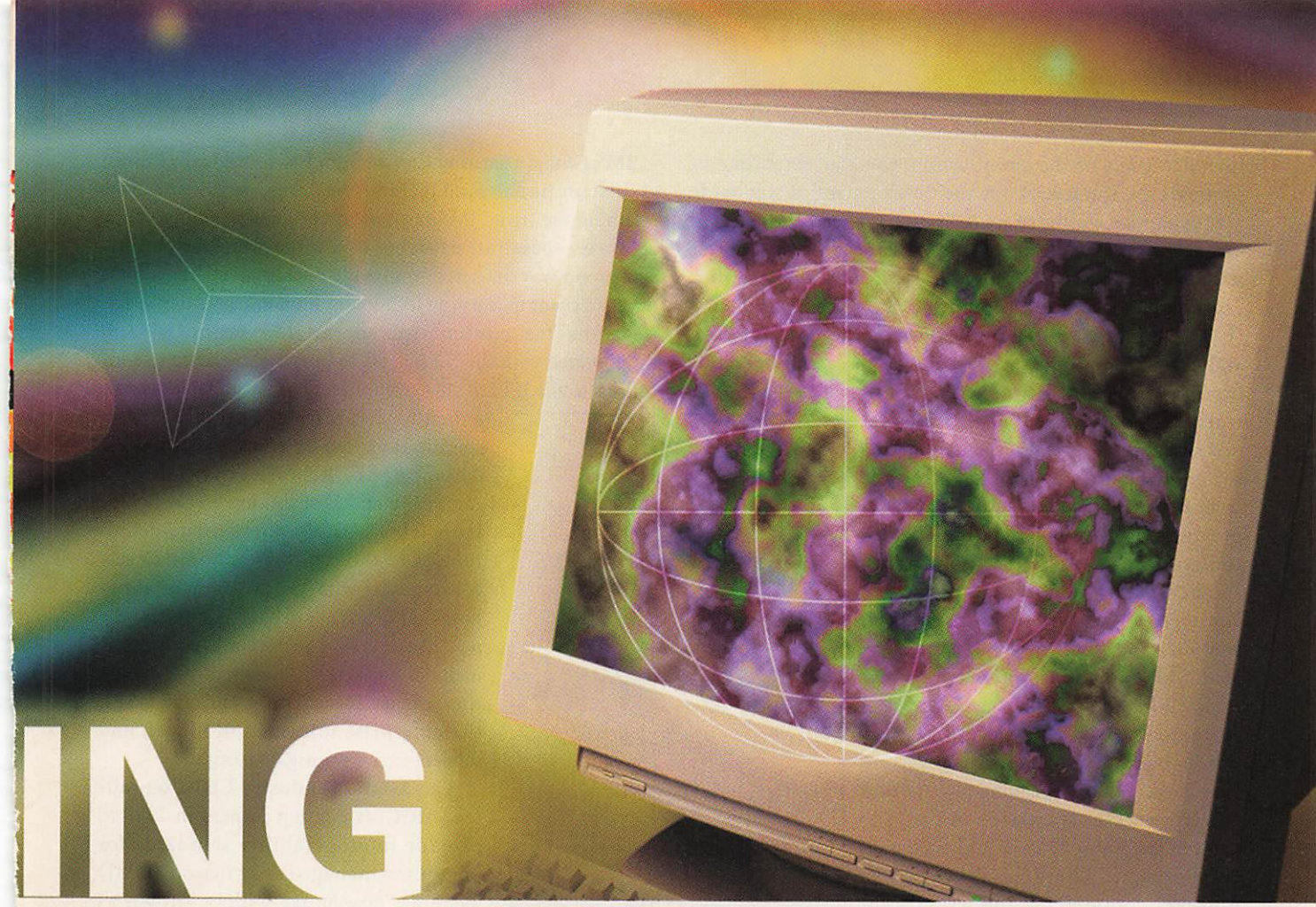



# LEARNING TECHNOLOGY STANDARDS

**By Nishikant Sonwalkar**
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

With the widespread adoption of technologies for education, standards to ensure interoperability will not only stabilize technical performance; they will promote collaborative development and the sharing of educational resources. In the first article in a two-part series, Nishikant Sonwalkar introduces the evolution of standards and the key organizations leading development.

Illustrated by Susan Morrison




# Part I: Development and Evolution

Standards play an important role in the development of innovative processes and technologies. Historically, the development of standards indicates that a particular process or technology is maturing and has achieved a degree of commercial success, such that there is a need for standards compliance. Standards provide a measure of quality assurance and build consensus among stakeholders regarding accepted norms for compliance and criteria for certification. However, the primary benefits of standards, for both software and hardware technologies, are interoperability and integration.

Simple examples to illustrate interoperability are the standards for compact discs (CDs) and what were originally called Digital VideoDiscs (now simply DVDs), which allow data to be stored and transferred between systems without any problem. A simple example of integration can be seen in building IBM-compatible PC systems; in this case, the assembly of PCs is only possible because of the hardware compatibility specifications. In the area of hardware, the standards are often measurable parameters of physical systems and their operational behavior; in the case of information technology, they emerge more often as normative and informative specifications for interoperability and integration.

Figure 1

**Development of IT standards**

**Steps for building successful information technology standards**

- Requirements
- Functionality
- Conceptual model
- Semantics
  - *Binding APIs* – *encoding calling conventions*
  - *Binding Coding* – *encoding data formats*
  - *Binding Protocols* – *encoding various communication layers*

Source: IEEE LTSC P1484.1/D9

### Standards Development

In the context of learning technology, standards are still evolving. Standards organizations such as the Institute of Electrical and Electronics Engineers Inc. (IEEE), the International Organization for Standardization (ISO), and the International Electrotechnical Commission (IEC) keep records of normative standards that provide references necessary for conformance and interoperability. As such, the development process of formal standards is laborious, tedious, time consuming, and requires numerous components (shown in Figure 1) as described in the IEEE P1484.1/D9 draft standard for Learning Technology Systems Architecture (LTSA).

In Figure 1, the requirements and functionality steps describe the need for the

intended goals of the specification, the conceptual model proposes the framework for the development of standards, and semantics are the exact definitions related to the interoperable components and systems. The details of the formal standards are then developed in the form of (a) an application program interface (API) that provides the calling conventions, (b) the binding coding, provided for the data formats, and (c) binding protocols that define the communication layers. The specifications/standards have two kinds of wording: normative, the sections that describe technical requirements imposed for conformance; and informative, the sections describing specifications and best practices that are not requirements for conformance.

There is a common perception that commercial vendors try to make their technological implementations "inoperable" with other similar products in order to keep—and in some cases force—customers to stick to their proprietary products. And consumer organizations have a reputation for striving to work with "interoperable" standards in order to provide freedom of choice and encourage competition. There is, however, an inherent commercial opportunity for innovative companies that put their inventions in the public domain to become the industry standard (e.g., Red Hat Inc.'s Linux). Of course, at the end of the day, consumers ultimately decide, through the widespread adoption of one standard over the other. At the onset of technological development, there are always competing methods and technologies vying to become the industry standard; the challenge is to make a standard that is easy to implement and thus win widespread adoption in the public domain.

...[Each of these organizations] has a specific expertise it brings to the host of issues that need to be addressed for the future of learning technology standards.

**EDITOR'S NOTE**

Be sure to watch for ***"Demystifying Learning Technology Standards, Part II: Acceptance and Implementation,"*** scheduled to appear in the April issue of *Syllabus* magazine.

### The Organizations

In the past decade, and particularly since 1997, several organizations have begun work to evolve standards related to learning technologies for the development of metadata, curriculum taxonomy, course structure hierarchy, data models, learning objects, assets, sharable objects, content aggregation and system architecture, and personal and private information.

These organizations present documentation to the IEEE Learning Technology Standards Committee, P1484, the designated body with a recognized charter to create standards. The IEEE LTSC P1484 membership has several working groups to develop specifications and standards related to aspects of learning (see http://ltsc.ieee.org). The key organizations that are currently proposing standards for learning technologies are described below.

**IMS Global Learning Consortium Inc.**—originally known as Instructional Management Systems (IMS) and now retaining the name IMS but not the original meaning of the acronym—began its existence as a project of EDUCAUSE. The group was chartered to provide open market-based standards relevant to learning technology and, in particular, specifications for content metadata. IMS proposed and collaborated with the IEEE LTSC to propose metadata specifications to the IEEE P1484 committee. That work later became a draft for the Learning Objects Metadata specification. Similar efforts started in the Alliance of Remote Instructional Authoring and Distribution Networks for Europe (ARIADNE) on metadata definitions, and those groups are now closely collaborating with IMS. It is important to note that the IMS work being done now is not limited to content metadata, but includes areas such as content packaging, the Learner Information Package (LIP), the enterprise information model, and others (see www.imsglobal.org).

The **Aviation Industry CBT Committee (AICC)** is a group formed in 1988 to provide interoperability standards for computer-managed instruction (CMI) systems, now more widely known as learning management systems or course management systems. AICC primarily caters to the CMI systems developed for the aviation industry and related vendors, and it provides AICC guidelines and recommendations. The contribution of AICC is particularly important in the CMI database schema and the interoperability of the database objects extending to several computer-based training course management and assessment systems. AICC is working closely with the IEEE LTSC in several areas of mutual interest. It also provides test suites for AICC certification (see www.aicc.org).

The **Advanced Distributed Learning (ADL)** effort, started by the White House Office of Science and Technology Policy in 1997, received initial support from the Department of Defense (DOD), though it now falls within the Department of Labor. The activities of ADL Co-Labs focus around the development of the Sharable Content Object Reference Model (SCORM) specifications, which include metadata standards from IEEE LTSC P1484 (as submitted by IMS) and CMI database schema (submitted to IEEE by AICC).

The ADL Co-Laboratory Network supports the ADL initiative with a network of collaborative laboratories (Co-Labs). This network currently has three independently supported entities with distinct operational responsibilities. They are: the DOD ADL Co-Lab in Virginia, the Joint ADL Co-Lab at Orlando, Florida, and the Academic ADL Co-Lab at the University of Wisconsin-Madison.

The ADL Co-Labs are collaborating closely with ARIADNE, IMS, AICC, and IEEE. At present, SCORM 1.2 is distributed and includes the content packaging and sequencing recommendations proposed by IMS. The specific goal for SCORM is to create learning technology standards for creation of durable, reusable, interoperable, and accessible courses for defense and industry training. ADL also provides a test suite for checking conformance to SCORM 1.2 specification. The ADL Co-Labs regularly organize "plugfests" for commercial and university systems to demonstrate SCORM conformance (see www.adlnet.org).

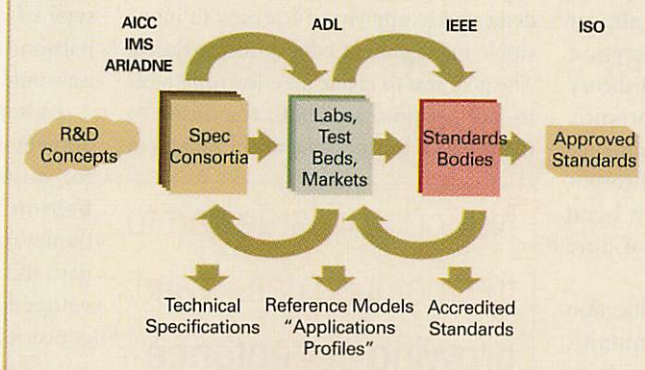
### Process and Evolution

In 1999, the ISO Joint Technical Committee 1 created Subcommittee 36 to address and create ISO standards in the area of learning technology to support automation for learners, learning resources, and learning institutions. It is expected that the specifications and standards developed by IEEE will be submitted to ISO for formal internationalization—a process that may take several years until final acceptance.

The organizations highlighted above are working closely together to promote standards for learning technologies. All are trying to achieve essentially the same overall objective, but each one has a specific expertise it brings to the host of issues that need to be addressed for the future of learning technology standards.

Figure 2

**A collaborative development model for formal learning standards**




Source: Philip Dodds, DOD ADL Co-Labs

Figure 2 shows a schematic of the integrative collaboration model adapted by most learning technology standards organizations. The procedure illustrated is as follows: (1) write specifications within AICC, IMS, or ARIADNE; (2) integrate, extend, and test in SCORM/ADL; and (3) formalize nationally and internationally in ISO/IEEE. It is expected that this process will lead to a formal ISO standard in a few years. As illustrated, the technical specifications originate in the consortia. The Co-Labs then create and operate test beds for conducting conformance testing. The test results generate reference models for selected technologies. The reference models, or applications profiles, are then submitted to the standards bodies for accreditation.

### Associated Efforts

Besides the work of the organizations already described, there are other efforts focused on developing standards related to learning technology. The World Wide Web Consortium (W3C), headed by Tim Berners-Lee at MIT's Laboratory for Computer Science, is devoted to pushing the technological forefront ahead and has provided numerous useful specifications and standards. These include standards relating to Extensible Markup Language, Web accessibility standards, and standards and a framework for Synchronized Multimedia Integration Language implementations (see www.w3c.org).

Another emerging organization of note is the Open Knowledge Initiative (OKI), started at MIT with major funding through an Andrew W. Mellon Foundation grant (see http://web.mit.edu/oki). OKI now includes several prominent universities as partners, and it is focusing on an approach to creating an open API environment as a glue for a host of support activities related to online education.

These efforts are intended to encourage interoperability of both the educational content and the underlying technology that will support the deployment of online courses. Standards will point toward the best practices that allow educational content to be used, reused, and deployed online. The educational content objects that enhance the learning process can be incorporated into the curriculum to enhance the educational experience. If existing content objects can be converted to adhere to interoperable standards (e.g., SCORM), then they may be used by a large number of community colleges and universities, as well as by the online training initiatives of the DOD.

Success will depend on demystifying standards in terms of implementation for instructional design and on the development of content sequencing models that allow multiple learning strategies that address individual learning needs. Part II of this article will focus on the acceptance and implementation of standards for instructional design, management of learning objects, metadata, and content aggregation.

*Nishikant Sonwalkar, Ph.D., is the principal educational architect at the Educational Media Creation Center at the Massachusetts Institute of Technology and serves as the pedagogical adviser for Web-based educational experiments and projects.* ***nish@mit.edu***

## ACKNOWLEDGMENTS

**Special thanks to:**

*Dan Rehak (Carnegie Mellon University), Jeff Merriman, Vijay Kumar (MIT), Bill McDonald (AICC), Judy Brown (Academic ADL Co-Lab), and Philip Dodds (DOD ADL Co-Labs) for their contributions to this article and for permission to use SCORM 1.2 figures and references.*

# Tailor-Made

## Customized Corporate Education

**By Tom Moore**
BABSON COLLEGE

The popular notion of a new graduate entering "the real world" points to the fact that we commonly view academia and the corporate environment as two disparate, almost polarized communities. The perception may be that universities focus on theory while businesses concentrate on practice. And to combine the two—to influence academic curriculum on behalf of corporate needs—has traditionally been frowned upon as a corruption of pure academic purpose.

This is not to say that higher education has ignored the corporate community. Colleges and universities have long offered corporate training programs and customized courses. However, corporate offerings and traditional degree programs have fallen into two distinct categories, usually considered to be very separate: the graduate degree program, typically thought of as the more rigorous education experience designed exclusively by academics, and the executive education program, a shorter-term, not-for-credit alternative intended to serve the corporation's needs.

Now, due in large part to the maturing nature and growing acceptance of distance learning, the wall that once stood between business and academia is beginning to crumble. Over the past few years, we've begun to see a blending of executive education and graduate degree programs. The result is a new model for professional education: the corporate-customized graduate degree program.

### The Babson College Experience

In 2000, Babson College opened the doors of Babson Interactive, a school dedicated to applying e-learning to innovative management education programs. The goal was to create an e-learning/face-to-face hybrid that is both responsive to the needs of businesses and culminates in a degree from an established brick-and-mortar university.

Now, due in large part to the maturing nature and **growing acceptance of distance learning,** the wall that once stood between **business and academia** is beginning to crumble.

When I was first hired by Babson College, I held the titles of dean of the Babson School of Executive Education and dean of its Graduate School of Business. My responsibilities included overseeing Babson's MBA programs and executive education courses at the same time. As I stepped into the position of CEO of Babson Interactive, I relinquished my role as dean of the Graduate School but retained my title and responsibilities as dean of Executive Education. It was clear from the start that e-learning offered high potential for an entirely new type of executive education, and that Babson Interactive was the place where we would explore the possibilities.

Babson had been watching the development of e-learning from the sidelines for quite some time before opening Babson Interactive. At first we were, frankly, not very interested. For the most part, the technologies appeared underdeveloped and unproven. We had great concern that the initial technology was not robust enough to provide the kind of insight and judgment building that we felt a good graduate program should offer.

In the past few years, however, we've seen the technology improve and have observed other institutions implement very successful e-learning programs. I now believe that a blended degree program—one that incorporates both e-learning and face-to-face instruction—offers an education experience that can, in fact, be superior to the traditional classroom experience. The key is in the proper balancing of these two learning modes.

A number of corporations have come to Babson Interactive. In one example, Babson, along with Cenquest, an e-learning company with expertise in creating online courses, developed a one-of-a-kind company-customized MBA

Illustrated by Dave Plunkert

# Degrees

degree program for Intel Corp. By combining the foundational and theoretical knowledge included in a Babson graduate degree with the strategic intent of the company, the program provided Intel with a completely new employee education option.

The customization of the curriculum took several forms. The Intel team offered input into the class electives. They also provided real work projects to be used as examples and incorporated into the coursework. Through e-learning technology, Intel executives, partners, and even customers could be included as guest lecturers.

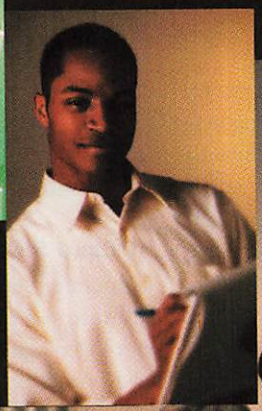
## ROI and Student Benefits

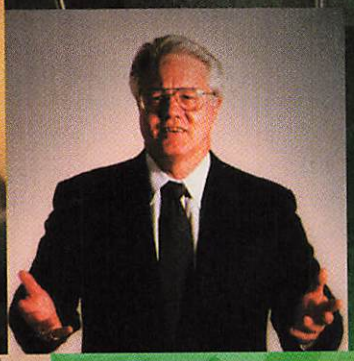
Corporations have long viewed company-reimbursed education as a standard employee benefit alongside health care and bonus programs. U.S. businesses spend $58 billion annually on employee education. And in a market where there is always fierce competition for top employees, offering quality education programs is seen as essential to hiring and retaining the best and brightest.

Unfortunately, the return-on-investment for company-reimbursed degree programs has been less than easy to quantify. Corporations have had little influence over the schools being attended, much less the programs being offered and the curriculum being taught. Aside from reimbursement contingencies based

# Syllabus.com

## Your online subscription source.





- Start a new FREE subscription
- Renew your FREE subscription
- Change your address
- Find back issues
- View the editorial calendar
- Contact the Syllabus staff
- And More

Subscribe online TODAY! Don't miss out on an invaluable FREE resource for improving the way you work.

Syllabus.com

101communications

on keeping a certain grade point average, businesses have had limited input into the nature of their employee's for-credit education experience. The programs are typically funded more upon faith and hope then on real data showing that employees will learn skills that will increase their overall value to the company.

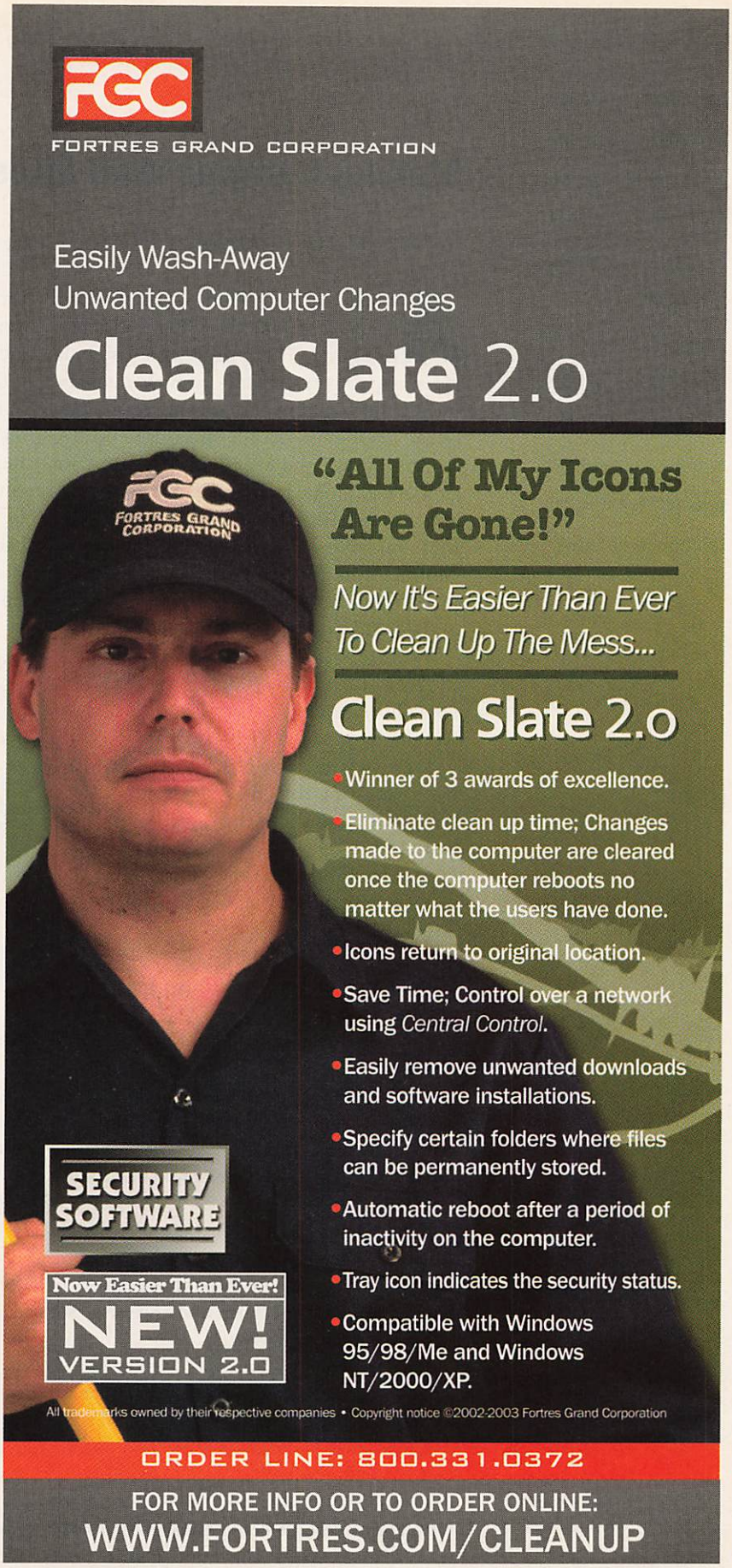
Perhaps a larger irony to these programs is that while they are seen as a necessary tool for hiring and retaining employees, they often have an opposite effect. It is not unusual for a company to pay for an employee's graduate education only to have that employee leave once the degree is obtained. In such cases, the reimbursement program often becomes a company-sponsored training ground for its competition.

Since the programs at Babson Interactive are designed to increase an employee's value to the company, chances are far better that graduates will continue their careers at the company once their degree is completed. And since employees work and study with other employees from various corporate locations, managers see the learning experience as providing a rare opportunity to build valuable employee relationships across company campuses.

### Lessons Learned

In the final analysis, there is a real learning curve involved in maximizing both the instructional and business models for this type of program. Still, it is clear that corporate education is heading in a new direction. Companies like Intel are looking to this new corporate education model to provide higher quality assurances and overall increased value. By combining a traditional graduate degree curriculum with content tailored to the needs of a company, customized degree programs offer unprecedented benefits to both the employee and employer and stand to ultimately redefine the relationship between academia and the "real world."

*Tom Moore is dean of Babson College's School of Executive Education and CEO of Babson Interactive.* ***moore@babson.edu***


FGC
FORTRES GRAND CORPORATION
Easily Wash-Away
Unwanted Computer Changes
Clean Slate 2.0
"All Of My Icons Are Gone!"
Now It's Easier Than Ever To Clean Up The Mess...
Clean Slate 2.0
•Winner of 3 awards of excellence.
•Eliminate clean up time; Changes made to the computer are cleared once the computer reboots no matter what the users have done.
•Icons return to original location.
•Save Time; Control over a network using Central Control.
•Easily remove unwanted downloads and software installations.
•Specify certain folders where files can be permanently stored.
•Automatic reboot after a period of inactivity on the computer.
•Tray icon indicates the security status.
•Compatible with Windows 95/98/Me and Windows NT/2000/XP.
SECURITY SOFTWARE
Now Easier Than Ever!
NEW! VERSION 2.0
All trademarks owned by their respective companies • Copyright notice ©2002-2003 Fortres Grand Corporation
ORDER LINE: 800.331.0372
FOR MORE INFO OR TO ORDER ONLINE:
WWW.FORTRES.COM/CLEANUP

MIT examines how to embed accessibility into Web design; new online courses earn 72 percent retention rate at Wisconsin college; Connecticut business school goes paperless with Palm; and Texas university gets point-and-click telephone network.

# Making Campus Web Sites Accessible Upfront

*By Kathleen Cahill and Jean Foster, MIT*

As many as 52 million Americans have trouble accessing the Web because of a disability. These disabilities include visual impairments, deafness, mobility impairments, and cognitive and learning disabilities. Other conditions—such as arthritis, repetitive strain injuries, and even lack of up-to-date equipment—impede access. These disabilities affect people in all walks of life, including those on college campuses. How then can a campus community ensure equal access to Web information and software, regardless of the abilities of each constituent?

For three years, a team of MIT staff from the Disabilities Services Office and the Information Technology Department has been exploring the problem of accessibility. The project began when the Web Accessibility Team came together to discuss concerns over the ever-increasing number of MIT Web pages created for student services, administrative tasks, general public information, and course materials.

**The MIT team's research led it toward an innovative "universal design" approach.**

The team's goals were to identify the design issues that were making Web pages and software inaccessible, detail federal laws pertaining to Web accessibility, and create and distribute a clear set of guidelines for MIT Web publishers to follow. Later, the team met again to discuss software accessibility issues and in the end developed sets of guidelines for purchasers of both Web-based products and software (see web.mit.edu/atic/www/sw).

One early solution used by Web designers was to accommodate those using nongraphical technologies with a second, duplicate Web site designed as text-only. However, this process doubles the number of pages that must be developed and does not fully address the problem of complete accessibility. The MIT team's research led it in a more innovative direction, toward a "universal design" approach.

The universal design approach is to design for the broadest range of users. Originally developed by architects, universal design means building for universal access upfront, rather than tacking on solutions for people with disabilities after the fact. In many instances, the design also improves access for those without disabilities. For instance, curb cuts on sidewalks make travel easier for people in wheelchairs as well as for those pushing baby strollers, pulling luggage carts, or in-line skating. Closed captioning on televisions improves access for everyone in noisy bars, health clubs, and airports.

The team's commitment to universal design resulted in an official policy and guidelines that were implemented in the fall of 1999. The major challenge was to educate the community about the issue because it seemed that most problems were caused by ignorance. To address this, the team posted the policy and guidelines on the Web, distributed a postcard announcement to all staff and faculty, and created appropriate documentation. They also began conducting monthly "Quick Start" classes on the topic for members of the MIT community.

The MIT Web Accessibility Policy was as follows: "MIT is committed to providing equal access to Web-based information in accordance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act. This ensures that MIT Web pages will be readable by users with disabilities. All Web pages associated with administration and services, courses of instruction, departmental programs, and institute-sponsored activities must conform to the MIT Web accessibility principles."

The policy was based on the World Wide Web Consortium's (W3C) Web Content Accessibility Guidelines (available at www.w3c.org/

TR/WCAG20). The W3C guidelines are the standard by which accessibility is determined for many institutions and government agencies.

Every public institution receiving federal funds is required to make appropriate accommodations to comply with Section 504 of the Rehabilitation Act of 1973. Section 504 requires program access, meaning that the programs offered by the college or university must be accessible to students with disabilities. Courses and activities must be made accessible, including the information technology that often accompanies courses, student activities, and online student services.

An updated law, Section 508, now requires federal agencies to provide accessible information technologies, including hardware, software, and Web pages. Some public universities may fall under Section 508's jurisdiction. For more information, see the Section 508 Web site (www.section508.gov).

Also, the Americans with Disabilities Act requires that places of public accommodation provide "effective communication" to people with disabilities. This has recently been extended to electronic and print communications made available to the general public.

Recent rulings by the Office for Civil Rights of the U.S. Department of Education have indicated that it is not sufficient for a college or university to simply fix an accessibility problem after the fact. It is incumbent upon the school to have an accessibility plan in place.

This requires an accessibility policy and guidelines, so that an institution can plan for and fully evaluate Web and software accessibility before problems arise. In other words, is not enough to deal with problems on a reactive basis; each institution must learn to evaluate how accessible its technology tools are and play a role in ensuring accessibility for all.

*For more information, visit* ***web.mit.edu/atic/www/sw.***

# Moraine Park Online Courses Boost Enrollment and Retention

Creating an online curriculum is not simply a matter of cutting and pasting course content into a Web browser. What works in the classroom often won't work in a distance learning environment.

Moreover, special considerations come into play when the student is participating via the Web. Often an entire syllabus has to be reworked from the ground up. It's important that faculty content experts work closely with instructional designers to develop engaging, interactive, and appropriate online content that encourages students to stay enrolled.

**The new online courses have boosted Moraine Park's enrollment by 1,400 students.**

Knowing that, administrators and faculty at Moraine Park Technical College in Wisconsin chose to partner with a learning design team to help them move 80 courses online in a short period of time. The transition team was committed to developing an online curriculum that maintained the college's performance-based principles. They also focused on supporting and boosting student retention.

The new online courses, which debuted in the fall of 2001, have captured a portion of the distance learning market and boosted Moraine Park's enrollment by 1,400 students. Most impressively, the school has managed an online retention rate of 72 percent, far exceeding national averages and Moraine Park expectations, according to Pete Rettler, Moraine Park's instruction technology partner.

In order to get the courses online in just four months, Moraine Park partnered with WIDS, a Wisconsin organization that incorporates software and training to help educators design learner-centered curricula that link outcomes and standards. Developed by the Wisconsin Technical College System, WIDS software for curriculum development is in use in schools from kindergarten through community college.

WIDS staff served as writers for more than a dozen online courses, working with instructors who were content experts to devise the online materials. They used performance-based principles to develop online courses such as "Psychology of Human Relations," "Economics," and "Written Communications."

The goal of the four-month project was to better serve a target market of self-disciplined, motivated students who were sometimes bound by geographical limitations, said Mary Ann Bazile, Moraine Park's partner for programming, design, and outcome assessment.

Moraine Park's general education courses, which are required for all associate degrees and technical diplomas, are now online. Other programs were also added, including Emergency Dispatch Program, Web Developer Program, Water Quality Technician, and Computer Information Systems Micro Programmer Specialist.

Two certificates—Legal Office Skills and Clinical Coding Specialist—were also added. The school plans to add more programs next year, for a total of 11 online programs.

Moraine Park officials wanted to ensure that online learners felt part of a community within the courses. Reten-

tion rates for online learners are low nationally, around 30 percent, according to Rettler. By actively involving students and addressing other areas that affect retention, such as curriculum and instructor training, Moraine Park's online courses have engaged and retained learners, according to Denise Martinez, the college's dean of general education.

Facilitating interaction between learners and teachers was a goal of the WIDS curriculum writers. Learning community frameworks were set up in each course, building interactivity through the use of discussion outlets, such as "chats," WorkSpace, and WorkGroups. And, whenever possible, performance assessment tasks were used instead of traditional exams.

Several initiatives are designed specifically to support retention. In addition to conducting instructor training, they offer new student orientations (which are available both on campus and through distance learning), and "lunch and learn" sessions, open to any instructor or student who wants to talk about the online education experience.

Most unusual is the placement of a "lurker" in each course. This person, a Moraine Park staff member, monitors the online courses and acts as a liaison between the learners and the instructor. The idea is to ensure that each student is engaging in the course and intervene if it seems the student might be dropping out.

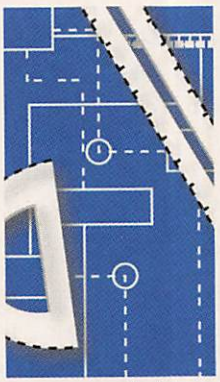
The success of securing a new market of learners came as a result of good teamwork and planning on the part of both Moraine Park and WIDS, says Cindy Thiede, vice president of teaching, learning, and corporate and community services at Moraine Park. "More than half of the online students are brand new to Moraine Park and haven't taken courses from us before. I'm hoping to increase that number next semester."

*For more information, contact Cindy Thiede at* ***cthiede@morainepark.edu.***

# U. Conn. Pushes Paperless with Palm

What ever happened to the decades-in-the-making idea of the "paperless office"? It's moving closer to reality, thanks to a unique program at the University of Connecticut's School of Business Administration that explores the use of digitization and mobile wireless technologies.

"The overarching goal of the three-course program is to push toward a paperless environment both in the classroom and in real-world business environments," said Gary Hendrickson, formerly director of information technology for the university's Connecticut Information Technology Institute and now director of technical projects at the university's School of Education.



Hendrickson and Chris Kalish, a technology executive working with the university to address real-world business issues, created and have been co-teaching the program's initial series of three courses. All students are given a Palm VIIx with Palm.Net wireless Internet access and a Seiko Instruments SmartPad to use while they are enrolled in the classes.

"A lot of the students became so attached to using the Palm handheld for note taking, scheduling, wireless Web browsing, and more that they purchased their own Palm devices as soon as the class was over," Kalish said. The first course, "Paperless/Virtual Office," was offered in the spring of 2001. Twenty-one students, mostly MBA candidates, analyzed the financial, technical, and marketing effects of significantly reducing paper-based processes in industry.

In the classroom, paper was banished. Tests were conducted electronically. Peer evaluations were done on the Palm handhelds and beamed to the professors and other students via the devices' infrared transmitters. The class even replaced the regular pads of paper that come with the Seiko SmartPad portfolios with inexpensive, reusable thin-film writing tablets (reminiscent of the Magic Slate children's toy). Notes and drawings written on the film are automatically transferred via infrared transmitter to the Palm handheld. Students can then simply lift the film to erase their notes, which are safely stored in the handheld, and write a new set of notes.

The second course in the series, "Mobilizing Commerce," took place in summer 2001. Here, the goal was to acquaint students with using digital processes remotely. Using the Palm.Net browser for wireless Internet access, students were able to extend—both in and out of the classroom—the work they had begun in the first course regarding the cost, productivity, and other benefits of moving to a paperless office. "The Palm VIIx became an essential tool to provide students with anytime, anywhere access to all the information they needed—and to each other," Hendrickson said.

At the social gathering held after the final class, the professors understood just how much the students had come to rely on their Palm handhelds to communicate. "When we realized we'd need more refreshments for the party, students already in attendance instantly grabbed their Palm handhelds to e-mail those on their way so they could bring more. We had an abundance of beverages."

The third course in the series, "Wireless Collaboration," will be offered in the spring 2002 semester. Students and teachers will work collaboratively to further extend their knowledge of digital wireless capabilities to help bring about the paperless office. "By using cutting-edge technologies like the Palm VIIx handhelds to explore the ways and means of achieving a paperless office, these courses are providing valuable insights for business students as well as for real businesses," Kalish said.

*For more information, contact* ***Gary Hendrickson at gary.hendrickson@uconn.edu.***

Illustrated by Allison Cusato

# IP Telephony Keeps Texas School Ahead of Growth

Reliable telephone service is critical to every institution of higher learning, and Lubbock Christian University is no exception. Dialing from dormitories and offices in the school's 25-building campus, LCU's 450 employees and 1,850 students generate a constant stream of calls. Telephones not only play a vital role in the school's academic and administrative pursuits, they are a lifeline to the outside world. So, with LCU's enrollment expected to swell to 2,000 this fall and new housing under construction, the school had an urgent need to jettison its antiquated PBX and Centrex phone systems.

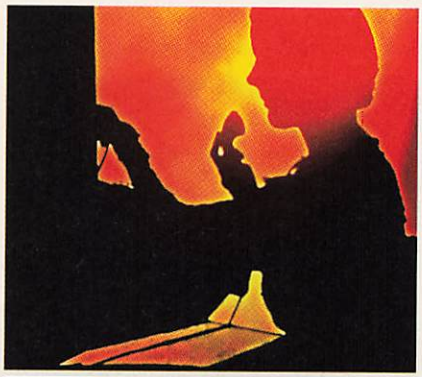
The old systems, which linked administrative buildings and dormitories, did not have available extensions, forcing multiple users to share a single line. Voice mail was nonexistent, and the central switchboard that routed all incoming calls shut down at 5 p.m. Most seriously, 911 calls summoned help to the main administrative building instead of to the calls' origins—a potentially dangerous situation that violated federal emergency requirements. Further complicating matters, the systems' 40-year-old copper phone wiring decayed to the point that extensions went dead on an almost weekly basis.

"We regularly spent half a day trying to find a single pair of wires still in good enough condition to connect a phone," said LCU director of technology Robert Smith. "Sometimes we had to physically move extensions because the wiring had gone out. It cost us thousands of dollars a year just to keep phones at our desks."

Excavating and replacing the entire telephone wiring system would have required weeks of construction. Over the previous five years, though, LCU had run Gigabit Ethernet fiber-optic network connections to every building, creating a high-speed data network. The most economical and least disruptive solution to LCU's phone problem, Smith realized, was to leverage the network to create a campuswide voice-over-IP (VOIP) telephone system.

VOIP technology turns voices into data, which can travel over an existing computer network via Internet Protocol (IP), eliminating the need for, and the expense of, a separate telephone infrastructure. Although an organization using IP telephony still has a standard connection to the telephone company to carry external and long-distance calls, all internal calls travel across the network.

VOIP goes anywhere a computer network can reach. With VOIP, adding



**Voice-over-IP technology can go anywhere a computer network can go.**

new extensions and services is as simple as expanding or upgrading the software. Each digital telephone console and desktop computer has its own unique network IP address, making extensions easily and instantly portable.

In August 2001, LCU installed 3Com's SuperStack 3 NBX IP-based business telephony system. It cost the school less than $500,000, "a terrific bargain," according to Smith. "We no longer have to pay a contractor $45 per hour to run wire every time we want to move, add, or change an extension," he said. "We also have virtually no maintenance costs, since we have to maintain the data network anyway. A comparable telephone system from another hardware company would have cost LCU almost $2.5 million more," he added.

With 1,000 available numbers, only 400 of which are in use, LCU's new phone system now has ample capacity for at least a decade. Each phone has its own individual, portable extension, which the 3Com system can locate at once, for easy changes and instant compatibility with Enhanced 911. For additional safety and security, LCU is extending the system to new courtesy phones in lobbies and lounges, on walkways, and in other public areas on campus.

By moving to VOIP, LCU now provides its faculty, staff, and students with high-quality phone service and advanced features that make communications flow more smoothly and conveniently. University employees can forward their calls to other desks, mobile phones, and their homes so they never lose touch with students, even during vacations. No call goes unanswered now that every desk and dorm room has voice mail and the option of cell phone paging for new messages.

Multiple lines and teleconferencing in administrative offices make collaboration simpler. An easy-to-use Web interface enables users to set up call forwarding, speed dialing, and other functions from any computer. Analog terminal adapters enable students to access most of the digital network's advanced features via the analog phones they already own. With the system's built-in call-tracking capabilities, LCU officials can evaluate telephone use to control costs.

VOIP has increased LCU's revenues by approximately $8,000 a month—the amount the school previously paid to the local telephone company to provide phone service to student dormitories, Smith said. "We're delivering more and better phone services to students than the local phone company provided at the same cost," he noted. "By enabling us to keep students' telephone fees in our own budget, our system will pay for itself in less than three years."

*For more information, contact Robert Smith at* ***robert.smith@lcu.edu.***

Illustrated by Jeff Langkau

FEATURED PRODUCT

# Luna: Building Digital Image Collections Online

In the teaching and collecting of the visual arts, perhaps the two greatest frustrations are gaining access to disparate collections and maintaining a set of high-quality reproductions of the works.

One-of-a-kind works are available only where they reside and must be viewed in the form of a reproduction everywhere else. As a result, small colleges and universities with limited resources struggle to maintain, catalog, and share their specialized collections.

In contrast, larger institutions must manage multiple collections and serve the needs of thousands of users, from students to curators.

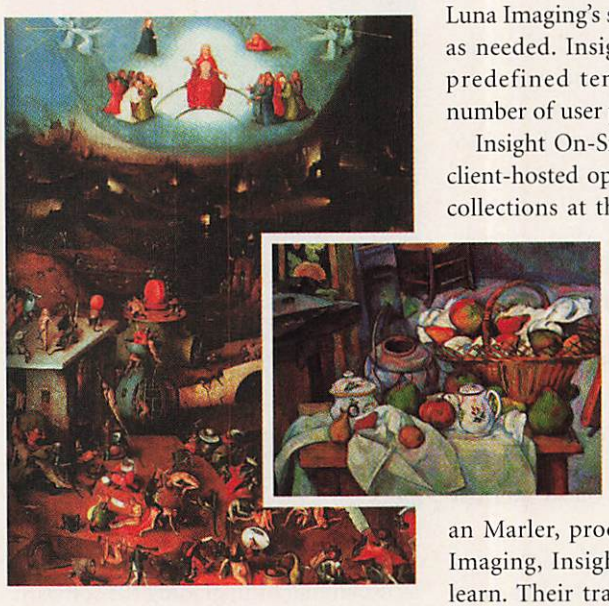
Collaboration among institutions has been frustrated in the past by technology limitations, leading to extraordinary duplication of effort using extremely fallible tools. Some of us can recall slide presentations in the classroom when a jammed carousel or a misplaced slide interrupted art history presentations.

Happily, the World Wide Web and digital imaging technology have revolutionized the way institutions can access and utilize the visual arts. Thanks to digital imaging technology, students, scholars, and librarians now have instant access to a wealth of high quality images.

One key provider in this area is Luna Imaging Inc., which develops "digital slide carousels" in the form of client/server digital imaging services and software for libraries, museums, universities, and foundations.

Founded in 1993 with support from the J. Paul Getty Trust and Eastman Kodak, Luna specializes in quality image banks that reside in a feature-rich digital environment. Luna Imaging sells both services and software. Smaller institutions with only one or two modest collections may choose the service route, preferring to pay Luna to develop a collection for them.

The conversion service transfers source materials into digital form, digitally capturing data from film, print, or original source material, with an emphasis on maintaining a consistent and faithful image. Luna technicians color-match to targets or match to the qualities of the original piece, compensating if need be for loss of color or clarity in the reproduction. Luna also offers project planning and management services along with image bank development.



**With tools and services from Luna Imaging, large and small institutions can boast rich archives of high quality digital images.**

Larger institutions with more extensive collections may choose to purchase Luna Imaging's Insight software, which allows on-site staff to build an image bank. Insight is client/server software that facilitates development, management, access, and use of digital images via the Internet.

Highly searchable and scalable, the Insight tool allows users to search digital catalogs and compare, sort, organize, and save images for particular applications.

Insight purchasers can choose from three versions of the software. With the Insight Hosted option, appropriate for small collections of fewer than 5,000 pieces, the digital image bank resides on Luna Imaging's server and is called forth as needed. Insight Hosted comes with predefined templates and a limited number of user profiles.

Insight On-Site and Insight Apex are client-hosted options that manage large collections at the institution itself and offer more features and flexibility. On-Site is for single collections, whereas Apex is designed for the large user with multiple collections to manage.

According to Megan Marler, product manager for Luna Imaging, Insight is easy to install and learn. Their training sessions last only two days. For the end user, Insight boasts a number of search features. Users can search by thumbnail, specific name, or general category.

Categories are defined on site, so each institution can determine categories that make sense for the particular collection at hand. For instance, a map collection would require search functions by country or region, and a collection of paintings would require the ability to search by artist and period.

Insight will display the textual metadata for any item on demand with a simple point and click of a mouse, and that information can be displayed in multiple languages. The software comes with built-in security features

that allow administrators to control who has access to the collection.

Luna's software and services are designed for classroom use as well as curatorial use by libraries and museums. As a classroom tool, Insight acts as a digital slide carousel, replacing and improving upon the traditional slide show with many more capabilities. Instructors can use Insight's presentation features to generate a classroom lecture that is more vivid, interactive, and pedagogically useful than slides permit.

Handy features include super-zooming, preset zoom, and the ability to lay more than one image on the screen simultaneously (what Luna calls the "digital light box"). Insight also saves instructors time. Once the presentation has been created, it doesn't have to be altered or re-created for each class section. However, it is relatively easy to drop in a new image or reorganize a presentation.

Because the images reside on the Web, students can all access the material simultaneously, instead of having to wait for materials on reserve to become available.

For museums and libraries, Insight offers new collaborative capabilities. According to Marler, because Insight is platform independent, it resolves any technology differences between one institution and another. In other words, two libraries can share data even if their systems are incompatible.

This "cross-collection search feature" is new, and clients are just beginning to take advantage of it. Says Marler, "the primary advantage is that by sharing, institutions can build a lot of content quickly."

After fewer than 10 years in the business, Luna Imaging has developed an impressive client list, including the Andrew W. Mellon Foundation, Yale University, Parsons School of Design, and the New York Public Library.

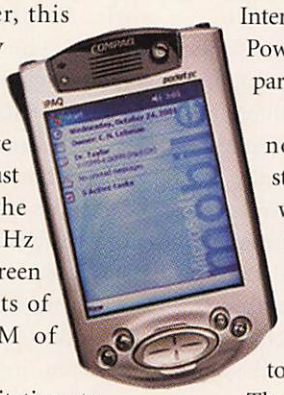
*For more information, visit* ***www.luna-imaging.com.***

# Compaq's iPAQ, a Time Multiplier

*By Brian Boyd, Arizona State University*

Arizona State University has recently adopted handheld computers in its High Technology MBA, a program offering a customized curriculum for managers in technology-intensive businesses. Starting last fall, all incoming students, faculty, and staff were equipped with Compaq Computer Corp.'s 3670 iPAQ handheld computers. Already, the devices are boosting productivity.

IPAQs run on the Microsoft Windows CE platform. For a user, this means the ability to carry an extension of your desktop PC around with you—in a 7-ounce device that fits in a coat pocket. Just over a half-inch thick, the iPAQ runs on a 206 MHz Intel chip, has a touch screen color display, and has lots of memory—typically 64M of RAM and 32M of ROM.



Although there are limitations to any small device, iPAQs are relatively easy to use. The latest model, the iPAQ 3870, has a 64,000-bit color display and a sensor that automatically adjusts screen brightness. This means that the screen display is viewable even in direct sunlight. Navigation is done mainly with a stylus, and there are shortcut buttons for commonly used tools such as the calendar and task list.

Although iPAQs accommodate data entry via a virtual keyboard on the touch screen or via stylus-based handwriting recognition, neither is intended for extensive use. For example, although I'm writing this article on my iPAQ, I'm using the optional Targus collapsible keyboard.

Future units will sport a BlackBerry-like keypad, with each key about the size of a button on a cell phone. The device also has a built-in microphone, a sort of tinny speaker, and a headphone jack. Finally, you can use a cradle to communicate with the desktop and an infrared port to speak with other nearby devices. You can also buy expansion cards for more memory or for tasks as diverse as GPS navigation, wireless communication, and connecting to an overhead projector.

The software design echoes a Windows PC environment: There's a Start menu that lists available programs, Find and Help functions, and the equivalent of a Control Panel. Most of the key Microsoft Office products are available, with slimmed-down versions of Word and Excel, Outlook compatibility, and Internet Explorer. The omission of PowerPoint is glaring, but third-party equivalents are available.

Why adopt iPAQs instead of notebook computers? Our students have demanding jobs, which means 20 hours a week for grad school on top of a 50 hour-plus workweek. And, the majority of our MBA students already have access to a notebook computer.

The ease of carrying around the iPAQ, combined with its versatility and "instant on" features, gives it very different utility from a notebook PC. To get the most from the iPAQ, you need to use Microsoft Outlook on your desktop. Your calendar, contacts, tasks, key files, and incoming e-mail are automatically downloaded each time you connect. Any changes are then integrated back to the desktop. You can also synchronize across multiple desktops, which will ensure that the Rolodex and appointment book at your home and office actually match.

The majority of my students report that the iPAQ buys them at least 45 minutes of extra productivity each week. Over the course of a year, this translates to the equivalent of a 40-hour workweek. In other terms, during a two-year graduate program, I can generate two full weeks of productivity—at a cost of less than $8 an hour.

One goal of our MBA program is to help students focus on learning.

Although we don't find the iPAQ particularly useful as an instructional tool, it can still facilitate the classroom experience. For instance, when students received their devices, they found a class schedule already loaded in the calendar, major projects listed in tasks, course syllabi, and their first assignments. They also had an electronic copy of the student handbook and contact information for every one of their classmates, faculty, and staff.

There are a variety of ways to update this information during the year. If your institution uses Blackboard, there is a new package called Blackboard To Go that automatically downloads all new Blackboard content directly to iPAQs.

Also, our students do much of their work in teams, and the iPAQ simplifies some mundane aspects of working in a group. The infrared port, for example, allows students to beam virtually anything from one device to another. Instead of firing up several PCs and swapping floppies, students can share a 100-page business plan in just a few keystrokes.

Although the handheld computer market is still in the early stages, the capability of these devices will continue to evolve rapidly, as will the availability of new hardware and software add-ons. These changes will offer new opportunities to create classroom applications for iPAQs and related devices.

One final thought: There is a generational change under way affecting perceptions of small screens, or ease of interface. Indeed, a 45-year-old executive MBA student might be more apprehensive about using a Pocket PC than a 12-year-old who was weaned on Nintendo. An early sign of this trend are elementary schools that are using iPAQs as a testing tool—students take a device, complete the exam, and beam it to the instructor.

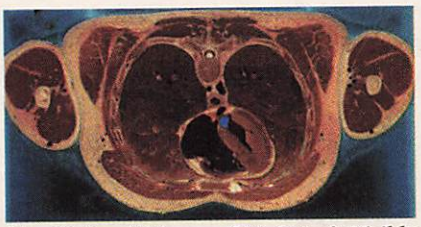
Because of such generational differences, innovations in the educational use of pocket computers such as the iPAQ will likely come from the bottom-up instead of the top-down.

*For more information, contact* ***Brian Boyd*** *at* ***briankboyd@asu.edu.***

# From Aesop to Isotopes: Digital Libraries Offer Vast Online Resources

## Internet Classics Archive

Visitors can select from a collection of more than 400 works of classical literature by 59 authors. All texts, originally in Latin, Greek, Chinese, or Persian, are translated into English. Here you will find the writings of three Chinese philosophers, including Confucius, and three Persian writers, as well as Ovid, Julius Caesar, Aristotle, Aesop, and others. The site, which originates at MIT, also includes a search function that facilitates use of the texts for classics research as well as related reader recommendations, trivia questions, and links to further information (the latter requires a user name and password for access to Britannica Online). See **classics.mit.edu/index.html**.



**The National Library of Medicine's Visible Human Project features detailed images of the human body for anatomical study.**

## National Academy Press

As publisher for the National Academies, National Academy Press publishes more than 200 professional-level titles a year in science, engineering, and health. An imprint of National Academy Press, Joseph Henry Press, is dedicated to publishing science titles for the science-literate lay reader. NAP's Web site, **books.nap.edu/index.html**, features more than 2,500 titles from both presses online for free reading. This invaluable service puts cutting-edge research at the fingertips of scholars, students, and the interested public. Instead of purchasing books or waiting for their availability at the local public library, readers can now click on the book they want to read and launch its contents into their browsers. A search function facilitates searching by title or keyword. A built-in personal agent allows a user to specify preferences, from which the NAP site will generate lists of new or recent titles fitting the reader's profile. From this Web page, visitors can also purchase printed and bound versions of books at an enticing 20 percent discount.

## Humanities Text Initiative

Based at the University of Michigan, the Humanities Text Initiative offers free online access to a wide array of classic, American, and European texts. At HTI, users will find four complete versions of the Bible, the Book of Mormon, the Koran, the texts of Abraham Lincoln's speeches, and the works of William Blake. Included in the Humanities Text Initiative's eclectic special collections are the American Verse Project, the Corpus of Middle English Prose and Verse, the Medieval Review, and a Bosnian Travel Guide. One special collection, the Making of America, is well worth visiting. It is a collection of scanned, original, primary documents in American social history from the antebellum period through Reconstruction. The collection currently contains approximately 8,500 books and 50,000 journal articles with 19th century imprints. These works are reproduced as image files, so visitors can view the original documents as they were set forth. See **www.hti.umich.edu**.

## Early English Books Online

Early English Books Online (**wwwlib.umi.com/eebo**) is an outstanding digital library of 125,000 texts, ranging from the first book printed in English by William Caxton through the Shakespearean period and the English Civil

War. This vast collection includes works by Malory, Bacon, More, Erasmus, Boyle, Newton, and Galileo, as well as musical exercises by Henry Purcell, prayer books, almanacs, calendars, and many other primary sources. The database can be searched by author, title, printer, publication date, type of illustration, and Library of Congress subject heading. Works are presented as PDF images. To access all of the material, visitors must obtain a user name and password. However, featured content is viewable free of charge, including more than 200 "greatest hits" of early English writing.

### Electronic Cultural Atlas Initiative

The Electronic Cultural Atlas Initiative is a global consortium of scholars in the humanities, social sciences and history, along with archivists, librarians, curators, and others interested in presenting scholarly information in a new way. ECAI TimeMap is a set of software tools that allow scholarly research results to be displayed in the dimensions of space and time, lending a geographic and temporal sensibility to the findings. More than a dozen projects currently take advantage of the ECAI's TimeMap architecture, including one on Austronesian linguistic mapping. See **www.ecai.org** for more information on projects that have been completed or are under development.

### Cuneiform Digital Library Initiative

The Cuneiform Digital Library Initiative (**early-cuneiform.humnet.ucla.edu**), a collaboration in progress between scholars at UCLA and the Max Planck Institute for the History of Science, is building a digital repository of cuneiform tablets dating from the beginning of writing, around 3200 B.C., until the end of the third millennium. Although scholars have been deciphering cuneiform for 150 years, many essential tools, such as a reliable paleography and a useful lexicon and grammar guide, are unavailable to most researchers. More than 120,000 tablets exist from this period. The CDLI dataset will consist of texts and images, combining document transliterations, text glossaries, and digitized originals and photo archives of early cuneiform. The online resource will be of interest to both distant scholars and to museums holding fragile collections of cuneiform that could be destroyed by frequent handling.

### Electronic Text Center at the University of Virginia

The Electronic Text Center (**etext.lib.virginia.edu**) combines an online archive of tens of thousands of SGML- and XML-encoded electronic texts and images with a library service that offers hardware and software suitable for the creation and analysis of text. The center, based at the University of Virginia, holds a collection of 45,000 on- and off-line humanities texts in many languages (including Apache, Chinese, and Japanese) and 350,000 related images. Of these materials, 5,000 texts and 164,000 images are available to the public. The rest are available only to the 39-campus community of the state university system. Represented disciplines include history, literature, philosophy, religion, and history of science, with collections in multiple languages. The university owns a number of special collections, including those on Mark Twain, Thomas Jefferson, the Salem witch trials, and the Plymouth colony.

### California Digital Library

The California Digital Library (**www.cdlib.org**) licenses scholarly materials, including journals, abstracts, and databases, and is creating electronic access to rare archival collections within the university library system. Among its wide-ranging collections are the Online Archive of California, a database of digital descriptions of archival and manuscript collections from libraries around the state (these archival search aids have never been available in electronic form before); Counting California, government data and statistics about our most populous state; the Melvyl Catalog, which records more than 15 million holdings; and the California Periodicals Database, to which the Getty Center, Graduate Theological Seminary in Berkeley, and state public libraries have contributed. CDL also stores thousands of electronic journals and specialized reference resources.

### HighWire

This science archive from Stanford University Libraries offers links to more than 370,000 articles from 299 journals and other research content providers. Through HighWire (**highwire.stanford.edu**), visitors can navigate through myriad journals in the life sciences, medicine, and physical sciences, as well as a few social science journals and useful non-journal sites such as the Oxford English Dictionary online. Visitors can search by author, subject, or discipline. HighWire does not serve simply as a portal, however. By including links among authors, articles and citations; advanced searching capabilities; high-resolution images and multimedia; and interactivity features, the site lends added dimensions to the information provided in the printed journals. Some of the journal content is available free to non-subscribers.

### Visible Human Project

The Visible Human Project from National Library of Medicine has produced complete, anatomically detailed, three-dimensional representations of the male and female human body using CT, MRI, and anatomical images. The datasets are designed to serve as a common reference point for the study of human anatomy, as a set of common public domain data for testing medical imaging algorithms, and as a test bed and model for the construction of image libraries that can be accessed through networks. See **www.nlm.nih.gov/research/visible/visible_human.html.**

# ADVERTISER INDEX

**Our advertisers offer a wealth of information on their products through their Web sites and telephone customer services. Below is a summary of all the advertisers in this issue, where you'll find their ads, and their telephone contacts and Web addresses.**

| Company | Page | Phone | URL |
|---|---|---|---|
| Applied Computer Systems, Inc. | 14 | (800) 237-5465 | www.acs-linksystems.com |
| AppWorx Corporation | 15 | (877) APPWORX | www.appworx.com |
| Campus Pipeline | C2 | (888) 682-7473 | www.campuspipeline.com |
| CDW Government, Inc. | 10, 11 | (888) 239-7282 | www.cdwg.com |
| Danka | C3 | (800) OKDANKA (press 1) | www.danka.com |
| Fortres Grand Corp. | 33 | (800) 331-0372 | www.fortres.com |
| Gateway | C4 | (888) 888-0795 | www.gateway.com |
| NISOD | 17 | (512) 471-7545 | www.nisod.org |
| Pepperdine University | 21 | (310) 568-5600 | www.gsep.pepperdine.edu |
| Syllabus Audience Marketing | 32 | (800) SYLLABUS ext. 7 | www.syllabus.com |
| Syllabus Academic Job Board | 7 | (800) SYLLABUS ext. 4 | www.syllabus.com |
| Syllabus Summer Conferences | 3 | (800) 280-6218 | www.syllabus.com |
| The Data Warehousing Institute | 9 | (469) 726-1495 | www.dw-institute.com |
| XanEdu | 5 | (800) 218-5971 | www.xanedu.com |

This index is provided as a service. The publisher assumes no liability for errors or omissions.

**Publisher**
**Mark Sande**
Phone: 818-435-5426
Fax: 818-734-1522
Email: msande@101com.com

**West**
**Western Sales Manager**
**Navid Davani**
Phone: 949-265-1540
Fax: 949-265-1528
Email: ndavani@syllabus.com

**East**
**Eastern Sales Manager**
**Mark Weeks**
Phone: 732-961-0885
Fax: 732-961-9547
Email: mweeks@syllabus.com

**Conference Sales Manager**
**Neil Whitney**
Phone: 800-SYLLABUS ext. 3
Fax: 818-734-1529
Email: nwhitney@syllabus.com

101communications

CHAIRMAN CURT HESSLER
PRESIDENT & CEO JEFFREY S. KLEIN
SENIOR VP & CFO STUART K. COPPENS
SENIOR VP, EVENTS AND EUROPEAN OPERATIONS STEVEN CROFTS
SENIOR VP, CHIEF INFORMATION OFFICER, AND GENERAL COUNSEL SHERYL L. KATZ
SENIOR VP, OPERATIONS BRADFORD C. STAUFFER
SENIOR VP, HUMAN RESOURCES MICHAEL J. VALENTI

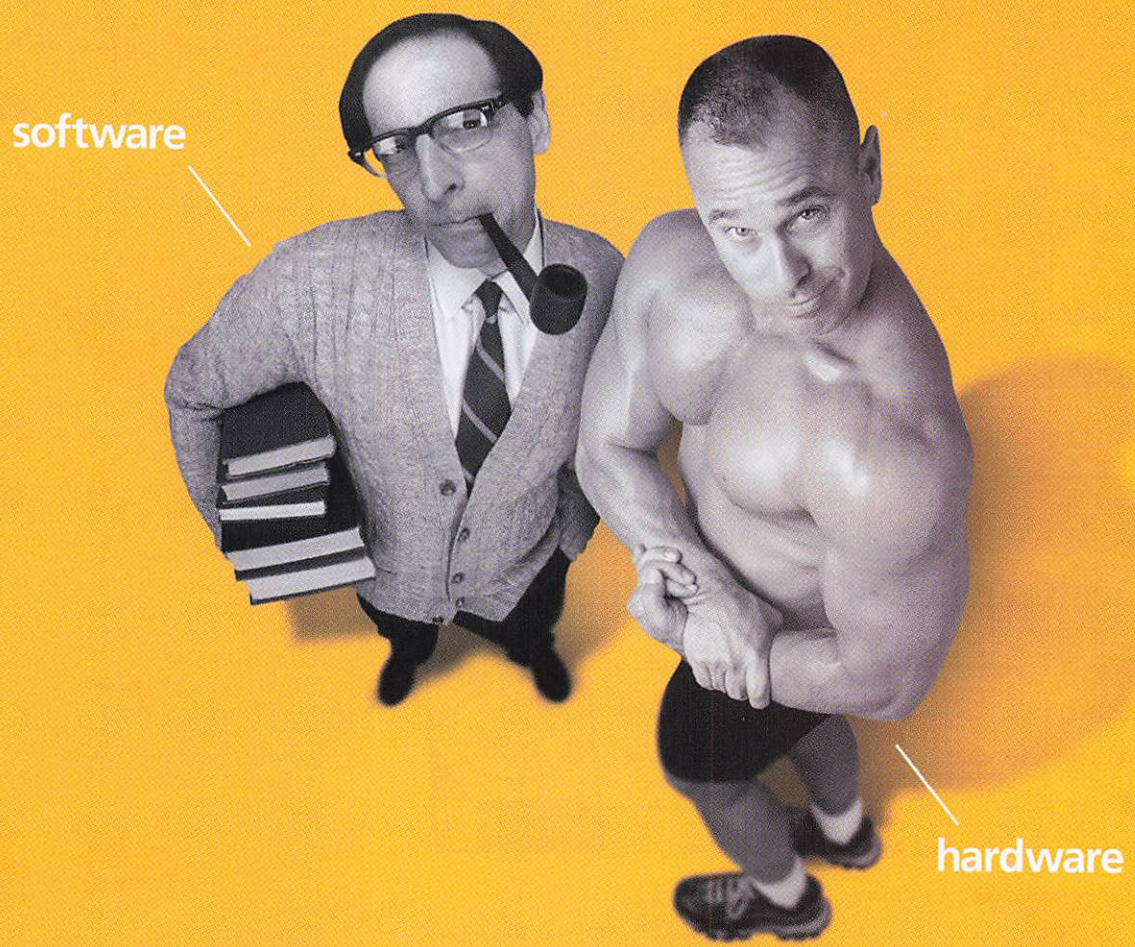
**Corporate Headquarters:** 9121 Oakdale Ave. Ste. 101, Chatsworth, CA 91311, www.101com.com. **Media Kits:** To request Media Kits, please call 818-435-5440. **Reprints:** For all editorial and advertising reprints of 100 copies or more, and digital (Web-based) reprints, contact Reprint Services at 651-582-3800 or kmandler@reprintservices.com. **List Rentals:** 101direct for postal and e-mail direct marketing lists in the IT industry, contact Cathy Dodies 215-643-8047, cdodies@101com.com, Jane Hope 215-643-8046, jhope@101com.com. **Conferences:** *SIGS/101 Conferences, Enterprise Linux Institute* and *TechMentor Conferences* contact Al Tiano, Sales Manager, 818-734-1520 ext. 190, atiano@101com.com. *The Data Warehousing Institute* contact Diane Smith, Exhibit Sales, 206-246-5059, ext. 108, dsmith@dw-institute.com; Denelle Hanlon, Publication and Sponsorship Sales, 206-246-5059, ext. 102, dhanlon@dw-institute.com. *FCW Events and Conferences* contact Lucy Cooley, Events Director, 703-876-5081, lcooley@101com.com.

© 2002 by 101communications LLC. All rights reserved. Reproductions in whole or part prohibited except by written permission. Mail requests to Mary Grush, *Syllabus*, 101 First Street, #605, Los Altos, CA 94022. The information in this magazine has not undergone any formal testing by 101communications LLC and is distributed without any warranty expressed or implied. Implementation or use of any information contained herein is the reader's sole responsibility. While the information has been reviewed for accuracy, there is no guarantee that the same or similar results may be achieved in all environments. Technical inaccuracies may result from printing errors, new developments in the industry and/or changes or enhancements to either hardware or software components. We assume no liability for unsolicited materials. Mention of products and services is for informational purposes only and constitutes neither a recommendation nor an endorsem ent by the publisher. Syllabus Press®, Syllabus®, SyllabusWeb, and the Syllabus logo are registered trademarks of 101communications LLC. All other trademarks mentioned belong to their respective owners.

*Syllabus* (ISSN 1089-5914) is published monthly by 101communications LLC, 9121 Oakdale Avenue, Ste. 101, Chatsworth, CA 91311. Periodicals postage paid at Chatsworth, CA, and additional mailing offices. Subscription rates: $24/year United States and Canada, $75/year International. **Subscription Inquiries, back issues requests and address changes:** Mail to: *Syllabus*, P.O. Box 2064, Skokie, IL 60076-7963 or call 866-293-3194 for U.S. and Canada, 402-293-3194 for International, fax 847-647-9295. Canada Post International Publication Mail (Canadian Distribution Sales Agreement #IPM40039410). **POSTMASTER:** Send address changes to *Syllabus*, P.O. Box 2064 Skokie, IL 60076. Printed in U.S.A.

DANKA®

*Serving your digital document needs.*




## With Danka, they're now of 1 body and mind.

Now you can take advantage of our incredible combination of the world's leading digital imaging hardware, application software and nationwide service and support. We call it DankaWare™ and it will maximize your company's productivity and efficiency like never before. For example, you can count on the Digimaster™ 9110 Network Imaging System manufactured by Heidelberg for all your high volume needs. While for your mid-volume and color needs, nothing compares to Canon's and Toshiba's affordable, state-of-the-art technology. So contact your local Danka office for a demonstration and let us help you devise the most cost-effective, customized solution to meet your company's needs. We'll do everything we can to make you a big hero.

Heidelberg Digimaster™ 9110

Canon Color Series

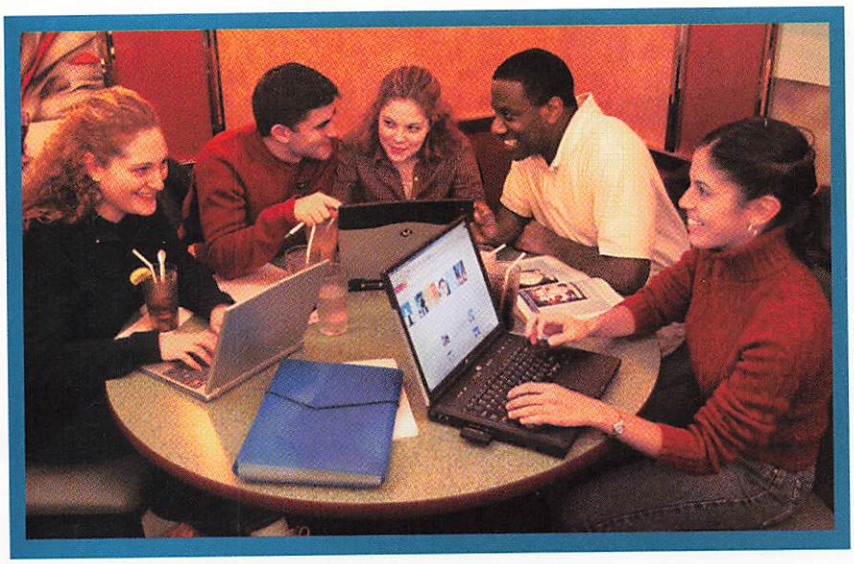
Canon IR Series

Toshiba Color Series

Toshiba e-STUDIO Series

**1-800-OK-DANKA**

(press 1)



TAKE THE NEXT STEP IN HIGH-TECH

# Remove barriers and put mobile computing within reach of more students.

Iona College, the first metro-New York college with a completely wireless Internet campus, did just that. They negotiated a deal with Gateway to offer Solo notebooks to students at discounted pricing, as well as through leasing arrangements. Advanced technology, like the Mobile Intel Pentium III processor-M, gives students a performance advantage.

The removal of barriers is another advantage, according to Dr. Warren Rosenberg, Iona College Provost and Vice-President for Academic Affairs, who said, "Access to faculty and course materials is much more convenient now. Lecture notes, class presentations and links to additional resources can all be posted online. Plus, we've eliminated the physical constraints of public hardwired connections." Classroom lectures, labs and library research are no longer limited to their conventional settings. Learning can happen anytime, anywhere.

Take your campus to the next level. Contact Gateway today.

**Count on Gateway for innovative education technology solutions.**

Gateway® PCs use genuine Windows® Operating Systems
http://www.microsoft.com/piracy/howtotell

| 888.888.0795 | gateway.com<br>AOL® Keyword: Gateway | Come into your local Gateway® store. |
|---|---|---|

## Solo® 1400SE Notebook

**Affordable Classroom Technology to Go**

- 14.1" XGA TFT Active Matrix Display
- Mobile Intel® Celeron® Processor 900MHz
- 256MB SDRAM
- 10GB Ultra ATA Hard Drive
- 8X DVD-ROM Drive
- Internal Modem and 10/100 Ethernet
- Microsoft® Windows®XP Home Edition

$999[1]

## Solo 5350CL Notebook

**Lightweight, Feature-Rich**

- 14.1" XGA TFT Active Matrix Display
- Mobile Intel® Pentium® III Processor-M 1.06GHz
- 256MB SDRAM
- 20GB Ultra ATA Hard Drive
- 4X AGP 8MB Shared Video Memory
- Modular 3.5" Diskette and 24X CD-ROM Drives
- Internal Modem and 10/100 Ethernet
- Microsoft® Windows®XP Professional

$1478[1]

## Solo 3450 Notebook

**Ultra-Thin and Light**

- 12.1" XGA TFT Active Matrix Display
- Mobile Intel Pentium III Processor 750MHz
- 320MB SDRAM
- 20GB Ultra ATA Hard Drive
- 8MB 2X AGP 3-D Video
- Docking Base with 3.5" Diskette and 24X CD-ROM Drives
- Internal Modem and 10/100 Ethernet
- Microsoft® Windows®XP Professional

$1978[1]

## Solo 5350 Mobile Wireless Lab

**The fast, easy way to add wireless access to campus.**

**Up to 16 Students — Includes:**

- 16 Solo 5350 Notebooks with Integrated Wireless
- 16-Bay Gateway Mobile Cart with RG-1000 Access Point

$29,706[1]

**Up to 24 Students — Includes:**

- 24 Solo 5350 Notebooks with Integrated Wireless
- 24-Bay Gateway Mobile Cart with AP-500 Access Point

$43,480[1]

**Up to 30 Students — Includes:**

- 30 Solo 5350 Notebooks with Integrated Wireless
- 30-Bay Gateway Mobile Cart and AP-1000 Access Point with Two Wireless PC Cards

$54,986[1]

Gateway®

1. Prices and configurations subject to change without notice or obligation. Prices exclude shipping and handling and taxes.

©2002 Gateway, Inc. All rights reserved. Gateway Terms & Conditions of Sale apply. Not responsible for typographical errors. Gateway.com and Gateway Country Stores, LLC are separate legal entities. Gateway, Solo, the Gateway Stylized Logo and the Black-and-White Spot Design are trademarks or registered trademarks of Gateway, Inc. in the U.S. and other countries. The Intel Inside Logo, Intel, Celeron and Pentium are registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Microsoft and Windows are registered trademarks of Microsoft Corporation in the United States and other countries. America Online and AOL are registered service marks of America Online, Inc. in the U.S. and other countries. All other brands and product names are trademarks or registered trademarks of their respective companies. Ad Code: 007895